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Demand and Opportunities for Alpine Skiing on the Anchorage District Chugach National Forest Alaska Region

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DEMAND AND OPPORTUNITIES FOR ALPINE SKIING ON THE ANCHORAGE DISTRICT OF THE CHUGACH NATIONAL FOREST

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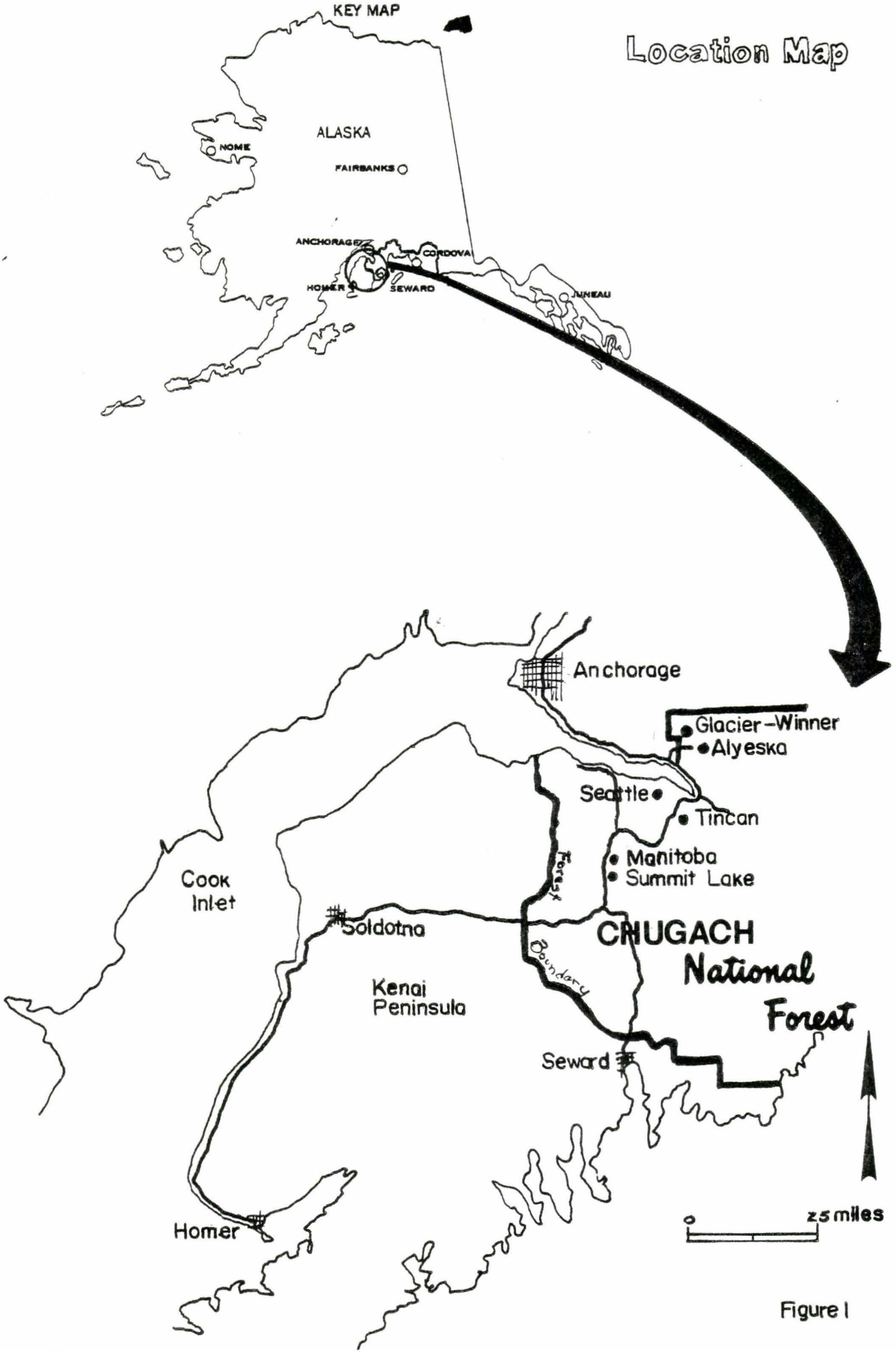
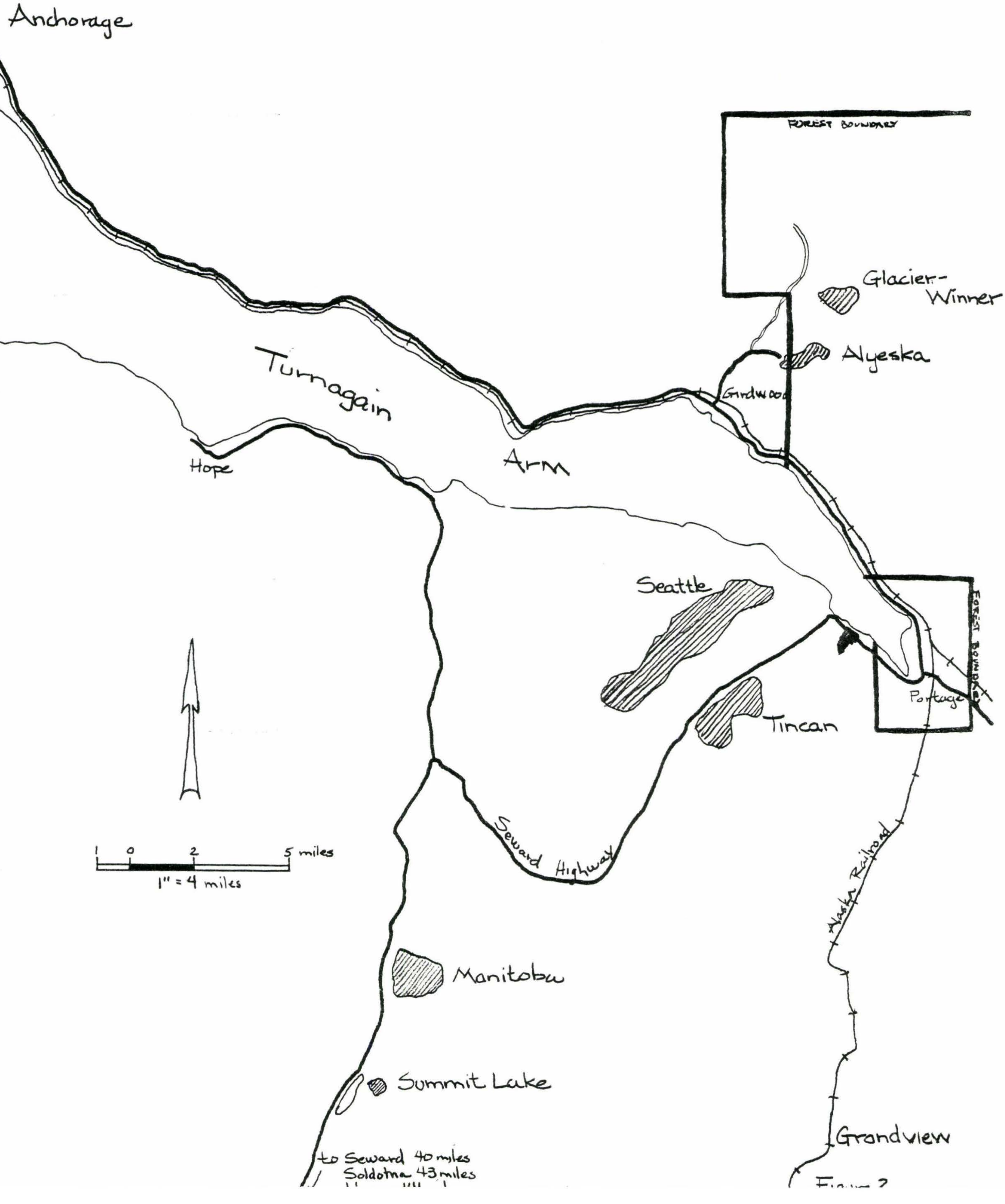

Location Map
KEY MAP
ALASKA
NOME
FAIRBANKS
ANCHORAGE
CORDOVA
HOMER
SEWARD
JUNEAU
Anchorage
Glacier-Winner
Alyeska
Seattle
Tincan
Manitoba
Summit Lake
Cook Inlet
Soldotna
Forest
Boundary
CHUGACH
National
Forest
Kenai Peninsula
Seward
Homer
0
25 miles

Figure I

Vicinity Map


Anchorage
FOREST BOUNDARY
Glacier-Winner
Alyeska
Girdwood
Turnagain
Arm
Hope
Seattle
FOREST BOUNDARY
Portage
Tincan
1 0 2 5 miles
1" = 4 miles
Seward Highway
Alaska Railroad
Manitoba
Summit Lake
Grandview
to Seward 40 miles
Soldotna 43 miles

Chapter I

INTRODUCTION

This report provides information on the opportunities and demand for alpine skiing on the Anchorage Ranger District of the Chugach National Forest.

A. Purpose

The purpose of this study was to respond to a Forest Service need for supply-demand information on alpine skiing for purposes of recreation planning and land allocation. This need was further intensified by private sector proposals for winter sports area expansion and development.

Prior to this study a number of areas on the Chugach had been considered over the years for potential winter sports development, but no comprehensive inventory existed. Before considering any of these areas there was a need to analyze the types of ski slopes available and to correlate the supply with the demand. This was necessary so that areas selected for development could meet the skier's needs and not duplicate other agency developments.

B. Objectives

1. To inventory potential ski areas on the Chugach National Forest and evaluate the terrain available (by gradient) as to suitability for the various skier skill levels.

2. To identify the Alpine Skier demand in the Anchorage area, particularly as it relates to the Chugach National Forest.

3. To compare the inventoried National Forest areas with the demand and the existing supply.

C. Setting and Overview

The area of concern in this study is located within the Anchorage Ranger District of the 5.9 million acre Chugach National Forest in Southcentral Alaska as shown on the attached location and vicinity maps (figures 1 and 2).

The Forest boundary is located approximately 40 miles south of Anchorage via the Seward-Anchorage Highway. Anchorage, Alaska's largest city, has a population of over 173,000 which is projected to nearly double by year 2000. Approximately two-thirds of the population of the State lives in Southcentral Alaska.

Surveys indicate that Anchorage residents are active participants in most forms of winter sports ranging from skiing to dog mushing. Participation rates in cross-country skiing are 20 times the national average. Alpine skiers polled indicate a higher than national average rate of participation. In a 1979 statewide survey, Anchorage residents placed recreation second only to being self-reliant.

With Alaska's only international airport, Anchorage is the gateway for almost all foreign visitors to the State and the destination of many visitors from the lower 48 states. In 1981 residents and visitors spent a total of 1,097,600 visitor days use on the Chugach National Forest.

The Chugach National Forest serves as a backyard summer and winter playground for many of the Anchorage residents. Currently there are more than 35,000 Anchorage resident skiers who spend more than 150,000 skier days at local ski areas in and around Anchorage. More than half of this use takes place on National Forest land at Mount Alyeska. Alyeska Resort, which is Alaska's largest alpine ski area, is located at the village of Girdwood on the northern boundary of the Chugach National Forest.

The study area starts at the northern boundary of the Chugach National Forest and follows the travel corridors south to the Seward Ranger District boundary at Summit Lake on the Kenai Peninsula (shown on the attached location map).

The landscape is characterized by rugged mountains that rise sharply from saltwater along Turnagain Arm to jagged peaks with permanent snowfields and glaciers. The Seward highway route along Turnagain Arm and over Turnagain Pass is considered by many to be one of the most scenic drives in Alaska.

Climate and snow conditions vary almost unbelievably within the area depending on distance from tidewater and elevation above sea level. For example, Anchorage has a relatively moderate climate and gets only 15 inches of precipitation because it is screened by mountains from the storms coming in off the Gulf of Alaska. In contrast, nearby Turnagain Pass, which is a thousand feet higher in elevation, averages 70 inches of precipitation. The marine influence often causes precipitation to fall as rain at lower elevations along tidewater while the same slopes 500 feet higher in elevation receive heavy accumulations of snow.

D. Relationship of this Study to Forest Land Management Planning and Public Involvement.

The Chugach National Forest is managed within the guidelines of a Forest Plan, implemented in 1974. A new land management planning effort is under way as directed by the National Forest Management Act of 1976. The Forest plan subsequently developed will specify broad management direction and allocations for the Chugach Forest, subject to ongoing revision and refinement. At another level of land management planning, project plans, developed year by year, will contain specific direction for accomplishment.

This study report will be used as a source document or bibliographical reference in the planning process described. As such, this study report can be useful to forest managers in the development of the Chugach National Forest Plan and/or project plans.

Public involvement for this study will be through the land management planning process, and at the planning level to which information from this report may be contributing. This involvement will be accomplished in a manner appropriate to the needs identified in that particular planning process and as directed in Forest Service Manual sections 1920 and 1950.

E. Delimitations

This study was concerned specifically with the demand for and the potential supply of alpine or downhill skiing opportunities on National Forest land. Other forms of outdoor winter recreation such as cross-country skiing were not included. The area of consideration for potential new alpine skiing sites was limited in this study to the Forest Service administered lands on the Anchorage Ranger District of the Chugach National Forest. Criteria set forth in Chapter III further limited the area of inventory to the existing transportation corridors within two hours' driving time from Anchorage. The study recognized that there may be other areas with potential for alpine skiing development outside Forest Service boundaries such as the Tokositna site in Denali State Park. Such areas are under the jurisdiction of other agencies or landowners who are responsible for deciding the appropriateness of their development. While other agency sites were beyond the scope of this study, it was recognized that planning for any new National Forest winter sports sites needs to take them into consideration and be coordinated with the other agencies. All existing facilities, regardless of land ownership, serving the Anchorage area were considered as a part of the supply-demand analysis since they directly affect the current demand on National Forest Land.

Potential areas except planned expansion of existing areas were not included in the supply-demand analysis due to their subjective and speculative nature.

F. Limitations

Data on existing facilities were gathered from current literature, interviews with area operators and agency officials, and use reports made available to the researcher. No new surveys or original research were conducted to determine skier demand. Potential sites on National Forest land were identified by contacts with Forest Service personnel, others who were familiar with the area, and by a map reconnaissance. A slope analysis was conducted by a staff specialist using topographic maps and aerial photos to identify favorable skiing terrain. Snow peak and climatological data and other factual information were gathered by staff specialists as time permitted. Field checks were conducted on the most feasible areas, but were limited due to time and budget constraints.

The scope of the study was limited to identifying what kinds of slope capacities are needed and which potential areas can best provide the desired slopes and skiing conditions. Detailed environmental constraints and socio-economic feasibility of the identified sites were beyond the scope of this study.

CHAPTER II

REVIEW OF LITERATURE

An initial step in this study was a literature search to find out what information was available on the demand for alpine skiing and on ski area development standards. The results were at first rather disappointing with a WESTFORNET computer search of six data banks yielding little of the desired information.

A continued search of local sources and contacts with people in the field were more fruitful resulting in six reports that were particularly relevant to this study. Following are summarizations of the relevant portions of these studies:

1. Winter Recreation--Potential Opportunities for Anchorage - Vol. I & II Final Report - by Trigon Sports International, Inc. and Sally W. Jones Associates, August 1981. The Municipality of Anchorage contracted for a study of winter recreational needs and opportunities for Anchorage residents and visitors. The study which was prepared by Trigon Sports International, Inc. and Sally W. Jones Associates was completed in August 1981. The consultants charge was to formulate a winter recreation plan that would:

" - Meet current and future needs of Anchorage residents;
  - Cause potential visitors to consider Anchorage seriously in travel plans;

- Provide the capacity for holding major international winter sports events; and
- Meet the standards necessary to enable the highest level of athletic competition - the Olympic Games."

The plan is quite comprehensive and deals with many other forms of winter recreation such as biathlon and dog mushing, besides alpine skiing. This review is limited to only the sections dealing with alpine skiing.

Chapter III, which deals with Market Support, was particularly relevant to this study. Demand for winter sports opportunities is discussed at length. Downhill skiing annual participation by Anchorage residents is projected to double by year 2000 with an estimated 647,252 participation days. A participation day is any portion of a 24-hour period in which an individual participates in a recreation activity. The report concludes that Anchorage residents participate more actively in winter recreation than residents in any other area of the country, and the implications are that Anchorage, despite its relatively small population, has a disproportionately large participation base from which to provide market support for winter recreation facilities.

Chapter IV gives an overview of existing facilities, however, it does not deal with numerical capacities. Chapter IV, which is entitled "Winter Recreation Evalulation", discusses the current facilities' capability to meet the demand. After mentioning that "Five Ski areas within the municipality provide services from a bunny hill to slopes of world class standards of difficulty"---, it goes on to say that "very few facilities are available, however, for the advanced beginner or the intermediate skier." In discussing the projected near doubling of downhill participation it states ..."at present levels it is unlikely that Anchorage facilities will meet the need." The conclusion drawn is that more facilities for the intermediate and beginner skill level are needed.

Chapter VI, entitled "Winter Sports Facility Plan," of the report proposes an ambitious development schedule of facilities for a wide spectrum of winter sports activities. In comparison to other activities, the proposals for alpine skiing are rather modest, consisting of limited expansion at existing areas and the possible development of a small beginner area near Eagle River. The plan really does not deal with accommodating its projected doubling of the resident skier population nor the potential non-resident market.

2. Selected Findings from the Alaska Public Survey: A Summary of Responses from Southeast and Southcentral Alaska, August 1981, by Roger Clark and Darryll R. Johnson. This is a preliminary report or "data abstract" of the results of the Alaska Public Survey. The Alaska Public Survey (APS) was a comprehensive Interagency Analysis of Recreation, Quality of Life and Related Issues. Cooperating Agencies included: USDA Forest Service, Alaska Region and PNW Experiment Station; USDI Bureau of Land Management, Outer Continental Shelf Office; USDI National Park Service, PNW Region and Cooperative Park Studies Unit; State of Alaska, Division of Parks; University of Alaska, Institute of Social and Economic Research; and the University of Washington, College of Forest Resources.

The Alaska Public Survey data are from interviews conducted at 2,888 households in Alaska in the spring of 1979. The report summarizes the statistical findings of the APS regarding food gathering, subsistence activities, marine recreation, community perceptions, general outdoor recreation, use and perception of management of Alaska National Forests, and social and demographic characteristics of the survey.

Of particular interest to this Forest Service study was the finding that 14 percent of the respondents in Southcentral Alaska participated in alpine skiing and 26 percent participated in cross-country skiing. Of Anchorage subgroup respondents, 17 percent participated in alpine skiing and 27 percent in cross-country.

Other areas of interest included data on distances people are willing to travel for recreation, activity preferences, percentages of equipment ownership and perceived barriers to participating.

3. Growth Potential of the Skier Market in the National Forests, USDA Forest Service Research paper WO-38, presents the results of a nationwide study of the skier market based on the 1978 telephone survey of 7,106 households. The report includes regional descriptions of active, inactive and potential downhill and cross-country skiers. Included are estimates of the size of these market classes and detailed descriptions of public images of and attitudes toward skiing, its cost attractions, facilities and market needs.

Skier market potential for growth is estimated and the perceived adequacy of the existing developed ski area resource is addressed in terms of its ability to attract and hold new participants. Of particular interest to this study were the data relative to the skill levels of the skier respondents. The study did not sample any of the Alaskan residents. However, the nationwide data related to skill levels are probably also representative of Alaska due to the massive relocation of people to Alaska from the lower 48 states in recent years. This study was particularly useful in analyzing projected demand by skill level.

4. Summary -- Denali State Park Visitor Facility Market Analysis and Economic Feasbility Study. July 1, 1980, by Economics Research Associates. This study was conducted for the State of Alaska Division of Parks to determine market support and economic feasibility for a visitor facility at the Tokositna site of Denali State Park. The market demand analyzed data gathered from surveys of Anchorage and Fairbanks residents, from focus group interviews and from reviews of existing tourism and visitor data. One of the alternatives being studied included a full scale year-round destination resort aimed not only at capturing existing demand, but creating its own additional demand. Another alternative evaluated a more modest facility serving existing demand. The report discusses Alaskan residents, U.S. tourists and foreign visitors characteristics, perferences, current uses and predicted use. One of the findings of the report was that Alaskan residents currently constitute a skier market of about 200,000 skier days. The researchers concluded that this level of participation is lower than potential because of the relatively few available downhill skiing opportunities. The sections on visitor demand which were particularly pertinent to this study were used to reference facts in the demand sections.

5. USDA Forest Service Draft Environmental Statement - Mount Hebgen, 1976, is an assessment that reports the impacts of two alternative skiing development proposals for Mount Hebgen on the Gallatin National Forest. The section on skiing demand and supply in Appendix B was particularly useful during this study. Included are discussions on the need to inventory skiing potentials,

demand for alpine skiing, socio-economic factors influencing demand, types of market areas, competive or complementary activities in market areas, and utilization of supply.

6. Situation and Prospects - Kenai Peninsula Borough - Economic Development Office - 1981, is an annual statistical report for the Kenai Peninsula Borough which provides data for measuring social and economic changes. It was an important reference used in the skier population projection of this study.

Other references included the Forest Service Manual (FSM 2300), working papers, and in-service guidelines on ski run planning. A number of ancillary reports were generated in the course of this project. These are included in the appendix and referred to as appropriate.

Chapter III

PROCEDURES

This section discusses the methods used to conduct this study. In order to meet the multiple objectives of this study it soon became apparent that there were three distinctly separate, but interrelated facets that needed to be studied. The limited time frame required that the data be gathered simultaneously so their results could be brought together and conclusions drawn from them.

The first involved gathering data on the existing supply of downhill skiing opportunities. The literature provided a good inventory of local areas and facilities, but lacked numerical data on existing site capacities. To evaluate the future need for new developments on National Forest lands, reasonably accurate capacity figures were needed on the existing facilities. Therefore, contacts were made with the managers of all the existing ski areas serving the Anchorage area to determine the capacities of the areas. The area managers were asked to estimate the capacities of their areas and determine whether or not there were expansion opportunities. A terrain analysis to determine the theoretical capacity of the sites was also independently conducted on the larger areas. Based on this information estimates of comfortable hill capacities were then made with a breakdown by skier skill levels. 1/

1/ Many factors influence and control ski area capacity. The total area available for runs is a major factor in determining theoretical downhill capacity. However other factors such as percent of slope gradient, run layout, lift capacity, slope grooming, parking capacity, access, aspect, season, weather, slope lighting, period of operation, skill level of users, and skier expectations and tolerance to crowding, affect capacity and may reduce the actual operating capacity from the theoretical slope capacity.

Area hill capacities were expressed in terms of SAOT's (skiers at one time). These do not include base facility capacities and may vary from the operator's estimates due to application of ski density standards for the types of slopes inventoried. Skill level capacities were based on the terrain analysis. Actual lift capacities and ski run-layout may differ from the terrain potential. For example an advanced run, crossing beginner terrain, would reduce the actual beginner capacity while increasing the advanced. Therefore, the capacities in Table IV-a should be used only for the cumulative purposes of this report. Chapter IV details the results of the study on existing ski area capacity.

Chapter V, which deals with the second area of consideration had to do with demand. Since it was beyond the scope of this study to do original research on demand forecasting, projections from existing literature were relied upon heavily. The primary source of reference was Winter Recreation, Potential Opportunities for Anchorage (Jones, et al., 1980). However, since the study presented its projections in terms of total annual participants, it was necessary to correlate the existing daily use with that of the study.

First, it was necessary to determine the amount of existing total use. This involved gathering use figures from all the existing ski areas in the area of consideration. Since total annual use is difficult to equate to SAOT capacities, it was necessary to analyze the data to determine how much use was occurring on an average weekend day or holiday. The assumption was made that weekends would be the time when the heaviest demand occurs and area capacity would be most limiting. Where data was available, weekend and holiday use was compiled and averages calculated. In other cases estimates were made upon whatever data were available, which in the case of some of the smaller areas, a rough estimate was made by the area operator. In total, the use figures are believed to be relatively accurate since the majority of the areas were able to supply good data on ticket sales.

Next, the average existing use at each area on weekends and school holidays was summarized. This provided an approximate figure for the current number of alpine skiers that can currently be expected on an average weekend day in the Anchorage area. This figure was then compared with the increases projected in the municipal report to determine the number of skiers that might be expected on a typical weekend day at four-year intervals over the next 20 years. National averages of skier skill levels were then applied to the projection to break down the estimated numbers of skiers that could be expected in each skill level on an average weekend day. This rough method is recognized as having little statistical significance, however, it does provide some indication of what can be expected in the future.

Chapter VI deals with the third and principal facet of this study consisting of an inventory of potential ski areas on the Kenai portion of the Anchorage District of the Chugach National Forest. As mentioned earlier in this report, the scope of the inventory was a broad brush approach to identify areas with terrain with high potential for ski area development.

First, inventory criteria were established to limit the search to those areas that would be feasible to develop and within day-trip driving time from Anchorage. The criteria used are as follows:

1. Must be in, or adjacent to, existing transportation corridors.

2. Must be within two hours' driving time from Anchorage.

3. Must have adequate skiable terrain in the beginner (8% to 25% slopes) and intermediate (26% to 40% slopes) classifications for development of a family-type day-use, or larger, alpine ski area that can meet the projected demand for the Anchorage market area.

4. Must not have extreme avalanche hazards, and hazards must be controllable without the use of military weapons. (This is in accord with current Forest Service direction.)

5. Must have adequate snow pack conditions to provide reliable snow conditions for skiing.

Next, areas were identified by a map reconnaissance of National Forest land adjacent to the road system within two hour's driving time of Anchorage. Numerous contacts were made with people familiar with skiing, such as ski area operators, snow rangers, representatives of local, state and federal agencies, and interested members of the public. In a few cases people who had heard of the study contacted us to volunteer information on areas that they felt should be included. Other sources of information included working papers and data collected from specific areas previously studied.

A terrain analysis was conducted on all areas that were identified as having potential for ski area development. This consisted of a map reconnaissance delineating skiable terrain of potential areas by slope gradient. Three skier skill level classifications were used. These were beginner (8% to 25% slopes), intermediate (26% to 40% slopes), and advanced (40% + slopes). Nonskiable terrain, and areas of extreme avalanche hazard were identified on aerial photos and then excluded. The terrain analysis was conducted by Chugach National Forest Soil Scientist Dean Davidson, an advanced cross-country and alpine skier. Timbered areas were also delineated and total acreage figures reduced to the estimated usable areas that could be cleared meeting visual quality objectives. After the adjusted skiable terrain areas had been delineated, acreages were measured using an electronic planimeter for each classification (See figure 3, foldout map). Skier per acre constants by skill level from Ski Run Planning Guidelines (PNW Ski Area Assoc., 1974) were then applied to the acreages to determine maximum theoretical capacities. The guidelines recommend ski slope densities of 20-35 skiers per acre for beginner slopes (8%-25% slopes), 10-15 skiers per acre for intermediate slopes (26-40% slopes), and 5 skiers per acre for advanced slopes (40% +). Skier per acre constants from the lower end of the range given in the guidelines were used because the gross skiable acreages determined probably included some areas that would not or could not actually be developed. It must be emphasized that the capacities are based on raw acreages which may not necessarily be developed at the skill level indicated by the percent of slope inventoried. In other words, some of the beginner terrain may be located in areas that would be accessed by intermediate or advanced runs. Therefore, some of the theoretical beginner areas would be developed as parts of higher skill level runs and would need to be deducted from the beginner area capacities.

The areas were visited by staff specialists as time and opportunity allowed. Climatological data and other inventory data were gathered and compiled by Chugach National Forest Hydrologist Dave Blanchet, an advanced alpine and an expert cross-country and mountaineering skier.

Chapter VII summarizes the findings of the three facets of the project. It then brings them together into conclusions and recommendations.

CHAPTER IV

CURRENT FACILITIES

There are seven ski areas currently operating in the Anchorage Area. These areas range from beginner slope rope tows in municipal parks to Alaska's largest ski area. In total they provide a theoretical hill capacity of 5640 SAOT (skiers at one time) under ideal conditions (see Table IV-a). Of this total capacity, approximately 24 percent (1370 SOAT) is rated as beginner; 46 percent (2570 SOAT) intermediate, and 30 percent (1700 SOAT) advanced. Ski run planning guidelines (PNW Ski Area Assoc., 1974) recommend that an area have approximately 10-15 percent of its capacity in beginner slopes, 60 percent or more intermediate, and 20 percent advanced. By these standards, there is an obvious lack of intermediate capacity compared to the beginner and advanced capacities. Such factors as limited operating schedules, lack of snow, road closures, inclement weather, and limited daylight reduce the concurrent availability of the total capacity, particularly during weekdays and periods of drought. For example, in the 1980-81 season, only about one-half of the capacity was in operation or skiable until late January because of a lack of snow. During such drought periods the availability of beginner-intermediate slopes is disportionately reduced due to their typically lower elevations, their proximity to coastal marine weather influences, and their location in low precipitation areas such as the Anchorage Bowl. As shown in figure IV-a, most of the beginner slopes are either not operable, or are of limited use due to snow conditions during poor snow years. Less than half of the beginner intermediate slopes can be relied on during drought years, while most of the advanced terrain remains skiable.

Planned expansion of existing ski areas could increase the total capacity up to 9000 SAOT's. The percentage of lower skill levels will increase; however, due to location, much of this expansion capacity will not be skiable during poor snow years as shown in table IV-a. Some of this expansion is also questionable due to technical problems with accessing some of the areas.

Following is an inventory of alpine ski areas currently operating in the study area:

A. Non-National Forest Areas

1. Arctic Valley Ski Area -- is a family type beginner-intermediate ski area located approximately 12 miles northeast of Anchorage on State leased land. It is operated by the Anchorage Ski Club, Inc., a non-profit organization. It operates weekends, school vacation days and national holidays. It presently has two chair lifts (chair 1: 2216' long with 813' vertical, chair 2: 4544' long with 1214' vertical), a T-bar/platter (2802' long with 984' vertical), and three rope tows. Base facilities include a day lodge with a cafeteria, restrooms, and ski patrol aid room, and parking. There are no overnight facilities in the area. With a base lodge elevation of 2640 feet the area has the highest base elevation of the existing areas in the Anchorage-Kenai area. The area is entirely above treeline and has a top lift elevation of 3,910 feet in elevation. The snow is generally good; however, the area has no facilities to pack the slopes. Lack of snow has been a problem in some years. In the 1980-81 season, the area did not open until late January.

Access is via a relatively steep road across Fort Richardson Military Reservation that is controlled and maintained by the military. This access is a somewhat limiting factor on use because studded snow tires or four wheel drive are normally required and chains are often mandatory. The estimated maximum capacity of the area is now about 1,600 to 2,000 skiers per day. There are plans to build a third chair lift in essentially beginner terrain for a total planned area capacity of about 3,000 skiers per day.

2. Hilltop Ski Area -- is a small local beginner ski area located on municipal land in southeast Anchorage. It is operated by Hilltop Youth Inc., a non-profit corporation. The present facility consists of parking and one rope tow. The area is adjacent to a system of lighted cross-country ski trails which is served by the same access and parking. It operates only weekends and school holidays. Low elevation and lack of precipitation are major factors limiting the use of available capacity during drought years, such as the 1980-81 season, when the area was not able to operate. Present alpine SAOT capacity is estimated at 100 skiers. Expansion plans call for the addition of one surface lift (length 2,000', vertical 300') with an estimated increase of about 350 skiers for a total beginner slope capacity of 100-200 SAOT and an intermediate capacity of 300 SAOT.

3. Russian Jack Springs Park -- is a small novice-beginner area owned and operated by the Municipality of Anchorage. Facilities consist of one rope tow, parking and sanitary facilities. It is located in a 320 acre park which is also used by cross-country skiers and other

recreationists. The downhill capacity is limited to 100 SAOT through a limit on ticket sales. Actual daily visits may exceed the 100 SAOT since additional tickets are sold at two hour intervals as people leave. The area operates five days a week. Low elevation and lack of precipitation are major factors limiting the use of available capacity during drought years, such as the 1980-81 season, when the area was not able to operate. No additional downhill capacity is planned.

4. Centennial Park -- is a small novice-beginner area, owned and operated by the Municipality of Anchorage Facilities. It has a lighted rope tow and sanitary facilities. It is open five days a week. Downhill capacity is limited to 100 SAOT through ticket sales. Low elevation and lack of precipitation are major factors limiting the use of available capacity during drought years, such as the 1980-81 season, when the area was not able to operate. No downhill expansion is planned.

5. Arctic Valley Military Ski Area -- is a small beginner - intermediate downhill area about 160 acres and located adjacent to the Arctic Valley Ski Area. It has one chair and three surface platter lifts with a total downhill capacity of 600 to 800 SAOT. It is open Wednesday through Friday 1 p.m. to 8 p.m., and on weekends 10 a.m. to 8 p.m. The slopes are lighted. Use is limited to military personnel and dependents. Lack of precipitation has been a problem during drought years such as 1980-81.

6. Hillberg Ski Area -- is a small beginner-low intermediate ski area on Elmendorf AFB. It has a platter, a T-bar and a rope tow with a capacity of about 300 SAOT. Area is open 1:30 p.m. to 9:00 p.m. Wednesday through Friday and 10:00 a.m. to 9:00 p.m. weekends and holidays. Use is limited to military personnel and dependents. Low elevation and lack of precipitation are major factors limiting available capacity during drought years, such as the 1980-81 season, when the area was not able to operate.

B. National Forest Areas

1. Alyeska Resort -- is a full facility resort located approximately 40 miles south of Anchorage at Girdwood on the northern boundary of the Chugach National Forest. Alyeska is Alaska's largest ski area with five chair lifts and two rope tows with a current capacity of 3,000 SAOT. The base area is on private land and the slopes are on National Forest lands. The base and facilities are owned by Siebu Alaska Inc., a private corporation, which operates the ski area under a special use permit from the Chugach National Forest. The resort operates seven days a week and has night skiing.

   The terrain is mostly upper intermediate and advanced with a beginner area at the base. Expansion potential includes the possibility of another chair lift to serve the existing intermediate slopes and the possibility of a surface lift up on a glacier above the upper chair. Expansion into other immediately adjacent areas on National Forest land is limited by unsuitable terrain and very high to extreme avalanche hazards. The existing area has a high avalanche hazard that is controlled through the use of military weapons. Full use of design capacity is limited occasionally in the lower slopes because of the lack of snow or wet snow conditions resulting from the low base elevation and coastal marine weather influence. The upper slopes usually provide excellent skiing.

Summary In summary, Anchorage currently is served by seven ski areas ranging from rope tows to Alaska's largest ski area providing a total capacity of 5640 SOAT. There is an imbalance in the amount of advanced terrain available compared to the limited beginner-intermediate terrain available. This is particularly acute on poor snow years when most of the beginner slopes are not skiable. Planned expansion plans could improve the amount of intermediate slopes available, however, poor snow years will still close much of the beginner terrain. Alyeska has limited expansion potential within the present permit boundaries and the immediately adjacent terrain is unsuitable because of extreme avalanche hazards and steep slopes.

Table IV-a

Estimated Ski Area Hill Capacities by Skill Level

	Existing Capacity				Potential Additional Capacity at Existing Areas				
Area	Beginner (SAOT)	Intermediate (SAOT)	Advanced (SAOT)	Total Existing (SAOT)	Beginner (SAOT)	Intermediate (SAOT)	Advanced (SAOT)	Total Potential (SAOT)	Existing & Potential Capacity (SAOT)
Alyeska Resort 1/	450**	1450**	950	2850	---- (595) 2/	(665) 2/ 450 3/	---- (80) 2/	450 (1340) 2/	3300 (1340) 2/
Arctic Valley	180**	750**	670**	1600**	980**	220**	135**	1335**	2935
Arctic Military Area	140**	370**	80**	590**	Data NA	Data NA	0	0	590
Centennial Park	100*	0	0	100*	0	0	0	0	100
Russian Jack Springs	100*	0	0	100*	0	0	0	0	100
Hilltop	100*	0	0	100*	100**	300**	0	400**	500
Hillberg	300*	0	0	300*	100*	0	0	100*	400
Total	1370 (24%)	2570 (46%)	1700 (30%)	5640	1180 (1775)	970 (1636)	135 (215)	2285 (3625)	7925 (9265)

1/ Existing capacity figures are estimations of the currently developed hill capacities, based on terrain analysis using the average skier per acre constants. Capacities in restricted catagories were added to the next higher skill level. The beginner and intermediate capacity shown may be high due to traffic flows of advanced runs that cross the lower skill level terrain and due to actual beginner lift capacity.

2/ Glacier Bowl potential capacity which may not be technically feasible for development, is based on maximum skier per acre constants.

3/ Assumption made that any additional lift capacity would serve intermediate slopes and that the slopes would be utilized at the maximum desirable skier density.

* Capacity not operational on drought years such as the 1980-81 season.

** Use of capacity limited during drought years or periods of warm marine weather.

CHAPTER V

SKIER DEMAND

The purpose of this chapter is to examine the potential downhill skier demand in the Anchorage area as it relates to Chugach National Forest lands. Since a current demand study was recently completed by the Municipality of Anchorage, no attempt will be made to conduct original research which would duplicate the Municipality Study. Rather, this report reviews the results of the Municipality Study (Jones, et al., 1981) and other current literature, and analyzes how the projected demand applies to National Forest lands.

As a part of Anchorage's Project 80's Civic Improvement Program the municipality contracted a study to assess the feasibility of municipal investment in recreation facilities as a means of improving the recreational opportunities of the Anchorage community and attracting visitors. The report, Winter Recreation Opportunities for Anchorage by Sally W. Jones Associates and by Trigon Sports International, Inc., was completed in August 1981. A review of it is included in Chapter II.

Demand

Demand can be defined as the quantity of recreation participation which would occur if opportunities were available. It must consider the skiing market at the national, regional and local level. Measurement of existing participation or consumption at developed sites can only be an indication of what demand might be because there may be a latent demand due to supply limitations. (USDA Forest Service, 1976)

The Anchorage Resident Market

The consultants utilized data from six surveys on which they based their projections. Estimates of population growth were multiplied by participation rates to produce an estimate of the future number of participants. Based on data from the 1979 Alaska public Survey (Clark, et al., 1981) and on the 1980 U.S. census, the researchers projected the number of Anchorage residents participating in downhill skiing as shown in Table V-a.

Table V-a

Anchorage Residents Participating

in Downhill Skiing

Year	1980	1984	1988	1992	1996	2000
Market Size	32,737	38,414	42,424	46,662	51,978	58,482

The researchers determined market size by multiplying the total numbers of resident participants by frequency rates obtained from the Alaska Public Survey. Their projected numbers of resident participation days in downhill skiing or market support in the Municipality of Anchorage is projected to almost double by year 2000 as shown in Table V-b.

TABLE V-b

Projections of the Number of Participation Days in Winter Recreation Activities in the Municipality of Anchorage 1/

1980 - 2000

Age Groups	Year 1980	Year 1984	Year 1988	Year 1992	Year 1996	Year 2000
Downhill Skiing						
7-17	136,579	164,889	193,868	216,583	249,395	285,383
18 & Over	194,838	237,368	275,306	295,839	324,348	361,869
Total	331,417	402,257	469,174	512,422	573,743	647,252

1/ Source: Courtesy of Sally W. Jones Associates

The total projected skier days for 1980-84 appear to be high when compared to actual skier participation days reported for the local areas. The total actual use for local areas only totaled about 145,000 skier days for the 1980 base year compared to a projected 331,417 residential skier days.

This suggests that either a smaller percentage of the resident population is skiing than indicated by the APS or that they are skiing less frequently than the survey shows.

This discrepancy may possibly be explained by the finding in a recent nationwide Forest Service study (USDA Forest Service 1980) that found only about 1/3 of the skier respondents were active, while another 1/3 were shown as inactive, and the remaining third as potential. Active skiers composed about eight percent of the population over 18 years of age, while inactive and potential skiers each represented another nine percent of the total American population over 18 years old. The sum of the active and inactive rates, eight percent and nine percent, are quite comparable to the 16.3 percent of Anchorage participants surveyed in the 1979 Alaska Public Survey (Clark, et al., 1981) used in the municipal report.

There is also another factor that is influencing the actual use. From Table V-f, it is apparent the seasonal totals of use fluctuate drastically. This fluctuation is related directly to availability of good snow conditions. For example, 1978/79 which was a good snow year, had a total of 184,000 days of use. In 1980/81, which was a poor snow year, there were only 119,000 days of use. This low usage was undoubtedly due in part to the drought that caused most of the local beginner areas not to open and restricted the use on the lower slopes of the areas that were able to operate.

While skiers in the Anchorage area are not actively skiing as much as they say they do in the polls, the fact remains that the actual use will still double by year 2000 if the population doubles and other factors such as the rate of participation and frequency do not change. The difference between the expressed interest in skiing and the actual participation may also indicate a latent demand which could result in higher participation and use frequency rates in the future. This could double the projections. One of the major barriers to tapping this latent demand appears to be the lack of reliable snow conditions on beginner and intermediate slopes during poor snow years.

The market analysis for a ski area proposal at the Tokositna site in Denali State Park, found that Alaska residents currently constitute a skier market of about 200,000 skier-days. (Economic Research Association, 1980). This figure compares very favorably with the 184,000 skier days use reported for the 1978/79 season. The researchers went on to conclude that this level of participation is lower than the potential because of the relatively few available downhill skiing opportunities.

It should be noted that the consultants for the municipality used a conservative approach in their projections, since they based their projections on the assumption that participation rates would remain constant. However, they noted that use of a Forest Service forecasting model projects significant total participation beyond projected population increases. Use of the Forest Service study high growth scenario would result in nearly doubling the projections for resident market support.

The Kenai Peninsula Borough Resident Market

Residents of the Kenai Peninsula were not included in the Anchorage Municipal Study of resident projections. While they are not resident users of Anchorage facilities, they are resident users of the Chugach National Forest. The majority (74%) of the Kenai Peninsula Borough population of 28,000 lives in the north central and eastern areas adjacent to the National Forest. Similar to Anchorage, Kenai residents utilize the National Forest as their backyard playground. Existing road conditions and travel time somewhat limits their use of developed ski facilities; however, they do represent a significant potential market. Presently, there is no major alpine ski area within the Kenai Peninsula Borough. Rope tows have operated at various locations in the past, including Summit Lake and Manitoba Mountain on the Chugach National Forest, and more recently in the Soldotna and Homer areas. During the 1982 ski season, only a rope tow was reported operating in the Homer area.

As a part of the Borough's Coastal Development Program, a model was developed to forecast population and economic activity through year 1992. (Kenai Peninsula Borough, 1981). Three cases were presented: high, intermediate and low, each based on different growth assumptions related to resource development. Since the borough projections only went to year 1992, the average annual growth rates (1978-1992) of 3.5 percent for Kenai and 3.3 percent for Seward were used to project the population through year 2000 as shown in Table V-c.

For purposes of this report, the intermediate growth projections are used to project skier market demand. The borough report stated that the intermediate case probably represents the closest approximation to future conditions.

Table V-c

Kenai Peninsula Borough

Population Projections

Year	Kenai-Cook Inlet	Seward	Total
1980	22,413	3,278	25,641
1981	23,440	3,294	26,734
1982	24,853	3,333	28,186
1983	27,137	3,384	30,521
1984	28,703	3,447	32,150
1985	28,055	3,528	31,583
1986	28,923	3,602	32,525
1987	31,405	3,645	35,050
1988	33,819	3,777	37,596
1989	33,148	3,880	37,028
1990	33,536	3,919	37,455
1991	34,216	3,994	38,210
1992	35,095	4,210	39,305
1993	36,323	4,349	40,672
1994	37,595	4,492	42,087
1995	38,910	4,641	43,551
1996	40,272	4,794	45,066
1997	41,681	4,952	46,633
1998	43,141	5,115	48,256
1999	44,651	5,284	49,935
2000	46,213	5,459	51,672

From these data it appears that the population of the Kenai Peninsula will nearly double by the year 2000. If the high case is used in the projection to year 2000, the population will triple to an estimated 86,100.

Presently only about five percent (Clark, et al., 1981) of the Kenai Peninsula residents participate in alpine skiing. Therefore, the present market is limited to about 1,400 skiers (.05 x 28,186). The same study showed Anchorage residents participating at a much higher rate of 17 percent. The national participation rate is nine percent. Perhaps one of the major reasons for this low participation rate is the lack of adequate alpine facilities within easy day-trip driving time.

The projected numbers of Kenai Peninsula resident skier participants are shown in three different scenarios in Table V-d. The low one projects the number of skiers based on the present percentage of participants and existing facilities. The medium one assumes additional facilities within easy day-trip driving distance. The high scenario assumes additional facilities within an easy day-trip driving distance and utilizes higher participation rates similar to Anchorage, which may be more representative of the Alaskan situation than to the national figures.

Table V-d Projected Kenai Peninsula Alpine Skiing Participants

	Low scenario (present participation rates of 5%)	Medium Scenario (national participation rates of 8%)	High Scenario (Anchorage ave. participation rates of 17%)
(Year)	(Skiers)	(Skiers)	(Skiers)
1980	1,282	2,051	4,359
1982	1,409	2,255	4,792
1984	1,608	2,572	5,189
1986	1,626	2,602	5,529
1988	1,880	3,008	6,391
1990	1,873	2,996	6,367
1992	1,965	3,144	6,682
1994	2,104	3,367	7,155
1996	2,253	3,605	7,661
1998	2,413	3,860	8,203
2000	2,584	4,133	8,785

Table V-e

Projected Skier Demand for Kenai Peninsula Residents
(Participants X National Frequency Rate of 9 Days)

Low scenario		Medium Scenario	High Scenario
(Year)	(Skier Days)	(Skier Days)	(Skier Days)
1980	11,538	18,459	39,231
1982	12,681	20,295	43,128
1984	14,472	23,148	46,701
1986	14,634	23,418	49,761
1988	16,920	27,072	57,519
1990	16,848	26,964	57,303
1992	17,685	28,296	60,138
1994	18,936	30,303	64,395
1996	20,277	32,445	68,949
1998	21,717	3,474	73,827
2000	23,256	37,197	79,065

There presently is a skier demand of about 12,700 skier days as indicated by the low scenario in Table V-e. If Kenai residents were participating in alpine skiing at levels comparable to the national average, this figure would increase to over 20,000. If they participated at the rates reported for Anchorage residents, the figure would more then triple to 43,000 skier days. This indicates a possible latent demand caused by the lack of opportunity.

Projected demands for year 2000 range from 23,250 skier days at present low participation rates to 37,200 skier days that might occur if the accessibility to alpine skiing were improved and Kenai skiers participated at the average national rate. If they participate at the reported rate of their Anchorage neighbors, a demand of 79,000 skier days is projected.

The Non-Resident Visitor Market

The municipal report discusses visitor market support at length, however, it does not venture any numerical projections. It states that Anchorage is in the "nascent" (or beginning) stage of developing a winter vacation market and that market penetration is low relative to market size.

Another recent study states that ..."Comparing the number of (non-resident U.S.) skiers willing to travel 1,000 miles to the historic number of skier days in Alaska, Alaska's historical penetration of the available skier market is less then one percent" (Economic Research Association, 1980). The researchers estimate currently there is a range of 3,000 to 6,000 non-resident skiers. They attribute the low penetration rate to limited tourist appeal of existing facilities and estimate that this could be expanded to a penetration rate of two to three percent with 40,000 non-resident skier days at the proposed Tokositna destination resort by 1985.

The municipal study identifies three major obstacles to enhance market penetration: (1) "lack of a clearly definable winter vacation product," (2) "lack of a reputation as a winter recreation destination," and (3) "public misperception (sic) outside (of Alaska) of the coldness of Anchorage winters." (Jones, et al., 1981)

Historically, the foreign market has represented only a small portion of Alaska's skiers (Economic Research Associates, 1980). The Japanese market was identified as having the greatest potential, however, only 600 Japanese skiers were reported to have traveled to Alaska in 1979. This is a decrease from a reported 3,000 in 1974. Japanese skiers visiting Canada have increased during this same period apparently due to new facilities and an aggressive marketing program in Canada. Due to Alaska's shorter distance to Japan, there is reason to believe that a significant number of Japanese visitors can be attracted to Alaska with an agressive marketing program and competitive destination resort facilities.

The municipal study concludes that ---"Assessment of available evidence indicates that there is more than sufficient market support to justify development of additional winter recreation facilities. Anchorage residents, who appear to be the nation's most active outdoor winter enthusiasts, will provide the major source of support for the facilities. Moreover, winter recreation development will position Anchorage in a growing segment of the winter travel market. Through time, market support from visitors should assume an expanding share of facilities use, but in total would remain small relative to the large resident demands." (Jones, et al., 1981)

Analysis of Existing Use:

In order to relate the projected demand to the supply on the Chugach National Forest it is first necessary to examine existing use and relate it with capacity. Table V-f shows the annual use over the past 5 years by ski area. It is noteworthy that 65 percent of the downhill skiing occurs on the

Alyeska ski slopes which are on National Forest Land. Total annual use does not necessarily relate directly to ski area capacities, as expressed in SAOT's, since use patterns vary depending on the day of the week and many other factors, such as weather and periods of operation. More meaningful to design capacities is the use that occurs on weekends and holidays when the areas are in full operation. Table V-g shows the estimated total use at each area on an average weekend day or school holiday by each area. These estimates were made by analyzing the available ticket sales data and by interviewing area operators. It is important to remember that the averages include many bad weather and low season days which bring down the average from peak use days which may be double that of the average.

Table V-f

Skier Days Use

	1976/77	1977/78	1978/79	1979/80	1980/81	Average
Alyeska	80,000	110,000	120,000	95,000	92,000	99,400
Arctic Valley	32,800	15,300	23,800	19,800	15,500	21,440
Arctic Military Area	Data N/A	N/A	14,000 est.	13,800	11,200	12,500
Centennial Park	2,500	650	2,400	2,200	- 0 -	1,550
Russian Jack Springs	N/A	4,300	9,000	4,800	- 0 -	7,650
Hilltop	N/A	N/A	2,000	2,000	- 0 -	2,000
Elmendorf AFB	N/A	9,000	13,000	7,000	- 0 -	7,250
Total			184,200	144,600	118,700	151,790

Table V-g

Estimated Average Numbers of Skiers
Per Day on Weekends and School Holidays

Area	1976/77	1977/78	1978/79	1979/80	1980/81
Alyeska	941	1,227	1,322	1,177	1,166
Arctic Valley	607	512	441	413	515
Arctic Military Area	Data N/A	N/A	est. 500	est.500	est. 500
Centennial Park	35	N/A	34	31	- 0 -
Russian Jack Springs	N/A	61	128	69	- 0 -
Hilltop	N/A	N/A	75	75	- 0 -
Elmendorf AFB	N/A	N/A	200	200	- 0 -
Total	---	---	2,700	2,465	2,181

TABLE V-n

Projected Average Number of Participants
Per Day on Holidays and Weekends

	Year 1980[1]	Year 1984	Year 1988	Year 1992	Year 1996	Year 2000
Participants	2,465	2,900	3,300	3,590	3,975	4,430

Projected Use

Based on the projected increase, total participation days doubling by year 2000, it appears that the current use on an average weekend day can also be expected to double by year 2000 if facilities are available. Table V-n shows projected increases in weekend and holiday use. Some of the anticipated use can be accommodated at existing areas by redistributing use through such things as slope lighting to accommodate evening use. However, the primary impact will continue to occur on weekends. Additionally it is very probable that an increase in non-resident visitor use will occur, which will more than offset the effects of local redistribution of use. With increased opportunity and diversity, it is very likely that there will also be an increase in the actual participation rates and the frequency rates.

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[1] 1980 was used as a base year for the projections since it approximated the average of the three years for which data was available.

Skier Skill levels - A recent Forest Service study (USDA Forest Service 1980) polled active skier respondents on what they considered their skill level to be. The results indicate that most skiers (59%) consider themselves in the intermediate skill level catagory as shown in Table V-i.

Skier Participant Skill Levels

Table V-i

	Western Region	National
Novice	4.8%	7%
Beginner	12.7%	16%
Low Intermediate	29.1%	28%
High Intermediate	36.4%	31%
Advanced	12.7%	14%
Expert	4.2%	3%

For purposes of this report the six skill levels in the study were combined into three as follows:

Novice-beginner - 23%
Intermediate - 60%
Advanced-Expert - 17%

Residents of the western contiguous states showed a slightly higher skill level than the rest of the United States and those from the south a lower skill level. This reflects the opportunity or lack of it to participate. While the study did not include respondents from Alaska, it is believed that the national average skill level is fairly representative of Anchorage. This assumption is based on the fact that many of the residents of Anchorage have recently moved here from all parts of the contiguous 48 states.

If this assumption is correct then the current 32,780 participants (Table V-a) could be expected to have about 23 percent novice-beginner, 59 percent intermediate and 17 percent advanced skiers. Projected numbers of Anchorage resident skiers by skill level are shown in Table V-j.

TABLE V-j

Projected Anchorage Resident Market Size by Skill Level

	Base Year 1980	Year 1984	Year 1988	Year 1992	Year 1996	Year 2000
Beginner	7,660	8,989	9,927	10,919	12,163	13,685
Intermediate	19,413	22,780	25,157	27,671	30,823	34,680
Advanced	5,664	6,645	7,340	8,072	8,992	10,117
Total	32,737	38,414	42,424	46,662	51,978	58,482

Table V-k, projects the average number of skiers per day on weekends and holidays that could be expected by skill levels based only on resident population increases. Increases in participation rates or frequency rates are not included nor is an increase in non-resident visitors.

TABLE V-k

Projected Average Number of Participants Per Day on Holidays and Weekends

(No change in participation and frequency rates)

	Year 1980	Year 1984	Year 1988	Year 1992	Year 1996	Year 2000
Beginner	567	665	735	808	900	1013
Intermediate	1479	1735	1916	2108	2348	2641
Advanced	419	492	543	597	665	748
Total	2465	2892	3194	3513	3913	4402

In the base year of 1980, on an average operating weekend day, with an estimated 2,465 skiers participating at one time, there were an estimated 567 beginners, 1,479 intermediates and 419 advanced skiers.

By year 2000 these figures nearly double with 1,013 beginners, 2,641 intermediates and 748 advanced skiers on the average holiday or weekend day. Peak days double these figures provided the facilities exist.

It is important to remember that the average weekend day projections in Table V-k were made on the assumption that only the number of residents will increase, with participation rates, frequency rates and non-resident visitor rates remaining constant. In all likelihood, some combination of these is apt to increase resulting in a much larger demand then shown in Table V-k. Another important consideration is that Table V-k represents averages. Given the number of bad weather days that effect the total number of days available, the average use figures are probably much lower than would be expected on typical good weather day when everyone wants to go skiing and over-crowding occurs.

This tends to be supported by comments made by skiers and ski area personnel who indicate a current shortage of beginner-intermediate terrain.

As mentioned earlier, there is a discrepancy when the projected annual use of 331,417 skier days for the base year of 1979/80 is compared to the actual reported use of 144,600 skier days. Since the projected use is a function of the population multiplied by the participation rate and by the annual frequency, it appears that either or both of the current actual rates are lower than indicated by the Alaska Public Survey data.

The municipal study shows a participation rate of 16.3 percent for adults (over 18 years) and a rate of 31.5 percent for youths (7-17 years). These rates multiplied by the population determined the number of participants or market size. The market size was then multiplied by the frequency or average number of times each year a participant engaged in the activity. The frequency shown for adults is 10.16 days per year and 14.57 for youths. If it is assumed that the actual participation rate is the same as indicated by the APS figures used in the municipal study, then an average frequency of only 4.41 days per participant (144,600 skier days ÷ 32,737 participants) is indicated. Conversely, if the actual frequencies are as high as the survey data used in the projections, then the actual number of active participants must be about half (14,288) of the projected 32,737 participants. This would result in an average participation rate of about 9.7. The actual situation probably is a combination of both less active participants and a lower frequency of use than the survey data shows. This may indicate that there is a latent demand which could result in more than doubling of the projected weekend use shown in Table V-k. If the projected use were doubled it would result in a demand of about 9,000 SAOT on weekends and holidays by year 2000. Of these, there would be an estimated 2,070 beginners, 5,400 intermediates and 1,530 advanced skiers per day.

It appears that this demand would only develop if circumstances changed which would allow and encourage residents to increase their actual participation and frequency rates to their expressed desired levels of activity. Expanded capacity offering new opportunities could be such a change which would trigger increased participation and frequency in downhill skiing. From the literature reviewed it appears that both increased skiing opportunities and the quality of the skiing experience resulting from the development of a new area could significantly increase the participation rates and double the projected demand (Economic Research Association, 1980).

Supply-Demand Analysis

There are some interesting comparisons that can be made when one compares the existing SAOT capacities as shown in Table IV-a with the projected average number of participants on holidays and weekend days shown in Table V-k and with latent demand projections shown above. Currently, it appears that there is adequate beginner-intermediate capacity to meet the current average weekend demand, but not on peak weekends in good snow years. In poor snow years, such as the 1980-81 season, there is a serious shortage of beginner and intermediate capacity with almost none of the beginner terrain available because of a lack of suitable snow.

Participants on an average currently only use about half or 2,465 out of 5,640 SAOT's of available total capacity. By year 2000 the average use would increase to 78 percent of the current total capacity if participation rates and frequency of participation remain constant. Analysis of use data shows that only on peak weekends is the total capacity of all areas ever approached. Some individual areas however, often operate at total capacity during periods of good snow. This is particularly true of the municipal beginner areas which must limit ticket sales and turn customers away to prevent over-crowding on good skiing days.

It is important to note that ski areas normally do not achieve full utilization of their theoretical capacity when averaged for the season. This is due to a number of reasons, such as poor weather and alternative recreation opportunities. According to the Mt. Hebgen report (USDA For. Ser. 1976), a 1964 study of western ski areas found total lift capacity utilized 82 percent on weekends, 21 percent on weekdays and only 44 percent for the season. A 1974 study reports seasonal industry wide utilization of 35 percent; therefore, it appears that the total utilization rates for Anchorage ski areas are slightly lower than those reported for the lower 48 areas. Individually, some may exceed the national average.

If participation rates and or frequency of participation increase to the levels indicated in the APS, the existing facilities would only meet about 64 percent of the demand by year 2000. Capacities for beginner and intermediate skill levels would be extremely short. The existing intermediate hill capacities (2570 SAOT) would only supply about 47 percent of the 5400 SAOT capacity that would be needed. Even if the potential additional intermediate capacity (970 SAOT) at existing areas is developed there would still be 1850 SAOT deficiency.

Beginner capacity would be short 650 SAOT. Expansion at Arctic Valley and other existing areas could possibly meet this need during good snow years, but not during periods of drought.

Advanced terrain capacity limits would be approached with an estimated demand for 88 percent of the existing capacity.

Summary

A review of current studies indicates that the alpine skier demand in the Anchorage area will double by year 2000 based on resident population increases alone. Increases in participation and frequency rates or development of the non-resident visitors' market could significantly increase the projections by doubling them. This study identified the resident population of the Kenai Peninsula as a significant market potential that currently has a lower than national skier participation rate. The reason for this appears to be the current lack of facilities within easy day-trip driving time. Lower 48 and foreign visitors currently represent a very small part of the Alaskan skier market. Literature reviewed concluded that through time, market support from visitors would assume an expanding share of facilities use, but in total would remain small relative to the larger resident demands.

Total existing use figures were compared to projections based on surveys. This resulted in a finding that the actual use was only about one-half the projected use for the base year. Since the resident population is only skiing about half of what would be indicated by the participation and frequency rates determined by polls, a latent demand may be indicated.

Skier skill levels were analyzed for comparative purposes with existing and projected capacities. Current use on the average weekend or holiday only amounts to about half of the existing capacity, however, there is an imbalance in skier levels and terrain. This is particularly acute during periods of drought or rainy weather when most of the beginner capacity and much of the lower intermediate capacity is not skiable. Therefore, while there is theoretically enough total capacity at present participation rates, there is a need for more beginner-intermediate terrain in locations with adequate predictable snow cover. The expansion of the population by year 2000 indicates market support for a moderate expansion primarily in intermediate terrain. Development of additional areas offering more varied opportunities and higher quality experiences may cause higher participation and frequency rates which could double the demand projections. This would result in a need to increase the total capacity available to Anchorage residents by an estimated 35 percent by year 2000. Much of this demand would be for intermediate terrain.

In view of the literature reviewed and of the analysis of the data available, there appears to be potential market support and need for development of additional alpine skiing capacity particularly on beginner and intermediate slopes.

Chapter VI

DEVELOPMENT OPPORTUNITIES

There are six potential ski areas that were identified in the course of this study. Of the six, three appear to have good potential for major development, and one has the potential of redevelopment as a local day use area for Kenai Peninsula residents. The three major areas meet the criteria mentioned in Chapter II in varying degrees, but some better than others. Staff reports in the appendix detail specific information concerning the sites.

The three areas that best meet the criteria for development are as follows: (non-prioritized list)

1. Glacier-Winner Creek--is located in Girdwood Valley approximately 4 miles up the valley from Mt. Alyeska. Road access would require 3 to 4 miles of new road construction or a large bridge across Glacier Creek and about one mile of new road construction with access from the Crow Pass Road. Alternative forms of access could involve lift access from the north side of Glacier Creek or mass transit from the village of Girdwood.

The terrain analysis of Winner Creek #1 inventoried 380 acres of beginner slopes, 157 acres of intermediate and 359 acres of advanced. The beginner terrain includes an area on the north side of Glacier Creek, opposite the base of the bowl. This area could accommodate more than twice the capacity of Alyeska with an estimated theoretical SAOT capacity of 9,000 beginner, 1,420 intermediate and 1,300 advanced skiers. The area ranges from 500 feet to 3,000 feet in elevation, a 2,500 foot vertical. All of the beginner terrain would not need to be developed, as it would not be needed, and would create excess beginner terrain at the area. Ski run development guidelines recommend only 10 to 15 percent of a site's capacity in novice-beginner slopes, 60 percent or more in intermediate slopes and 20 percent in advanced slopes. By these standards the development capacity is limited by the 1420 SAOT intermediate capacity to a total capacity of only about 2250 SAOT (ie. 355 beginners (15%), 1420 intermediate (60%) and 475 advanced 20%). It shall be noted however, that intermediate terrain analysis utilized the low end of the range for skier per acre density. Use of the higher figures would increase the intermediate terrain capacity and therefore the total by one third. Additionally, some of the beginner terrain in the upper bowl may be used as parts of higher skill level runs.

The upper bowl offers some excellent intermediate and advanced skiing. The lower half of the mountain is heavily forested and development of runs would require clearing about half of the timber within the area. This would involve greater vegetative manipulation than the other areas identified, but would allow skiing when high winds or whiteouts would close the upper bowl and other less protected areas. Rain and lack of snow on the beginner slopes could be a problem on poor snow years due to the relatively low 500 foot base elevation. This is a problem at the base of Alyeska which has a base elevation of 300 feet. More weather data is needed; however, the extra 200 feet in elevation and greater distance from the coast should improve the base snow conditions over that of Alyeska. The area has a moderate to high avalanche hazard which can be controlled without the use of military weapons.

There is an adjacent area, Glacier Creek #2, that has some potential for expansion into upper Glacier Creek drainage. With a top elevation of 4,500 feet it could provide year-round glacier skiing. It has a higher avalanche hazard, and more intermediate terrain.

The primary advantages of the Glacier-Winner Creek site are its relatively close distance (40 miles from Anchorage) and its proximity to the existing resort community of Girdwood. Development of Glacier-Winner Creek could utilize the existing infrastructure of Girdwood to concentrate alpine skiing into a large destination resort complex. The drawbacks that were identified are less reliable base area snow than some of the other areas inventoried, cost of access, amount of clearing required, and the coastal influence on the weather which can result in rain at lower elevations. The area also has less of its total percentage of potential slope capacity in lower intermediate terrain than the other major sites evaluated. Numerous mining claims have been staked in the area and could be a potential source of conflicting land use.

2. Tincan Mountain--located at Turnagain Pass, is about 58 miles from Anchorage. The Turnagain Pass Area is noted for its deep snow. With an average snow pack of 100 inches at its 1,100 foot base elevation, it has more reliable snow than any existing ski area and is as good or better than any of the other inventoried areas. Even during the worst snow years, such as 1980, it could be expected to have adequate snow. It has easy access, requiring only about one-half mile of new road construction from the Seward-Anchorage Highway. The terrain analysis indicated good beginner-intermediate skiing over much of the area. The terrain analysis identified 121 acres of beginner slopes, 500 acres of intermediate, and 111 acres of advanced. This results in

an estimated SAOT capacity of 7,975 for Tincan #1 with approximately 2,420 beginners, 5,000 intermediates and 555 advanced. The base elevation is 1,100 feet with a vertical rise of 2,200 feet to the top elevation of 3,300 feet. A number of cross ridges at Tincan #1 may limit run layout or require considerable slope modification. Tincan #2 is an adjacent area to the northeast near Wolverine Creek. It has a potential capacity of 5,320 beginners and 4,210 intermediates. The access route to this area is longer with an estimated 1-1/2 miles of new road needed to the base area and a bridge across Ingram Creek. Avalanche hazards are considered moderate at both areas and could be controlled without the need for military weapons.

The primary advantage of the Turnagain Pass area is the amount and quality of snow. Other favorable factors are the close proximity to the Seward-Anchorage Highway and limited road construction costs. Higher in elevation and farther from the coast, this area is apt to have less rain than the Girdwood area, however, the beginner-intermediate slopes can be expected to be colder and windier than those at Winner Creek. Tincan #2 is north-facing and is rather cold and dark in mid-winter. The primary disadvantage is its 60-mile distance from Anchorage and the lack of an existing infra-structure. The nearest community is Girdwood which is approximately 20 miles away. Unless developed as a small day use area, complete new base facilities would need to be developed. The Turnagain Pass area at Tincan #1 is extremely popular with local cross-country skiers. Development could provide for the needs of both alpine and cross-country skiers, however, those seeking the present undeveloped conditions would be displaced or have a different recreational experience than they desire.

This area was studied in the late 1960's and early 1970's during which time, weather and snow pack data were collected.

3. Manitoba Mountain--is located about 78 miles south of Anchorage and 4 miles north of Summit Lake on the Seward-Anchorage Highway. This area has the best beginner and low intermediate terrain of all areas studied. Access is quite easy with a possible reconstruction of about 1 mile of the old Seward highway and replacement of a small bridge or drainage structure. The initial area has 801 acres of beginners slopes, 400 acres intermediate, and 61 acres of advanced terrain with an estimated theoretical SAOT capacity of 16,000 beginners, 4,000 intermediates and 305 advanced skiers. There are also two adjacent areas with potential for the more advanced skiers. Obviously, development of all the beginner terrain would not be needed. Actual development capacity would be in the 5,000-6,000 SAOT range if the 60 percent or more intermediate terrain criteria is used.

Snow depths at Manitoba Mountain are somewhat less than at Turnagain Pass with an average of about 40 inches at the base, however, this amount is considered adequate. The area has a base elevation of 1,200 feet which rises at a relatively uniform 30 percent slope to about three quarters of the way to its 3700 foot summit. Manitoba, being farther from the coast than the previously mentioned areas, has a drier and colder climate. Therefore, drier snow and less rain can be expected. Colder temperatures, wind, occasional whiteout conditions and wind crusting will also occur. The area has a western aspect which provides more light and less flat light than north facing slopes during the cold dark Alaskan mid-winter months. The development of runs will require very little vegetation removal or slope grooming.

The primary advantages are the excellent low intermediate slopes with mostly fall-line skiing and the quality of the snow on the lower slopes. Other advantages are ease of access and minimal clearing and environmental disturbances needed to develop the area. The area is also close enough (within 40 miles of Seward) to provide relatively easy access and day use alpine skiing opportunities to the Seward and Kenai-Soldotna residents. The area is currently used by some cross-country skiers, but to a lesser extent than the Turnagain Pass area.

The principal drawback is the distance from Anchorage. Anchorage residents have expressed a desire for close-in recreational opportunities and this location takes about an hour and a half to two hours each way with current road conditions. Planned reconstruction of the Seward-Anchorage Highway will reduce this; however, the distance may deter many people especially in good snow years when other close-in areas are operating. A rope tow ski area has operated in the area in the past, but there are currently no facilities other then a few cabins in the immediate area. Summit Lake Lodge offers food and gasoline 4 miles to the south. Therefore, similar to Turnagain, complete base facilities would have to be developed if the area was developed as a full-service ski area. Development as a small scale day use ski area to serve Kenai Peninsula residents is also feasible due to easy access and limited clearing needed. A source of potential conflict is the number of mining claims located in the area.

Other Areas Inventoried Are as Follows:

1. Seattle Creek is located about 60 miles from Anchorage on the southwest side of Turnagain Arm. It is the largest of the areas inventoried. With almost 8,000 acres of skiable terrain, it has the size and potential capacity for development of a major destination resort. The terrain analysis of Seattle Creek #1 alone indicates a potential SAOT capacity of 8500 beginner, 11,050 intermediates and 7,300 advanced skiers. The snow pack conditions are believed similar to the Turnagain Pass area with about 40 inches at the base, and 150 inches at the 2,500 foot elevation. However, due to the lower base elevation of 500 feet and closer proximity to tidewater, the base area snow is probably more subject to occasional rain and icing conditions than either Turnagain Pass or Manitoba. The area is currently utilized for helicopter skiing. More information needs to be gathered on the area since little hard data have been collected on it in comparison to other areas inventoried. In addition to Seattle Creek #1, an adjacent area, Seattle Creek #2 in the upper bowls of the drainage, has an additional theoretical capacity of 14,700 beginners; 9,600 intermediate, and 10,300 advanced skiers. The huge size of this area far exceeds the anticipated demand in the foreseeable future.

Seattle Creek's most obvious advantages are its size, diversity and amount of snow (at least on its upper slopes). It also has some problems. Access is the most serious since it would involve 7 miles of new road construction, much of it along the base of steep, avalanche prone slopes. Another possibility is a gondola system up the back side of the mountain from Turnagain Pass. The area has a high avalanche hazard, but it appears controllable without the use of military weapons. Development of this area would necessitate the construction of a resort village. The cost of getting access and utilities into the area would preclude a small day use type operation. It is questionable if the current or projected demand would support the development of a major destination resort at Seattle Creek within the next 20 years. Because of its location outside of the Seward-Anchorage Highway corridor and the amount of road construction, or large transportation lifts required, it only marginally meets the first of the selection criteria discussed in Chapter III.

Summit Lake is a small area near Summit Lake about 83 miles from Anchorage and 40 miles from Seward. It has a theoretical slope capacity of 820 beginner, 760 intermediates and 590 advanced skier. A rope tow has operated in the past as a part of the Summit Lake Lodge concession, however, it has not operated for several years. The snow conditions would be quite similar to the base of Manitoba.

The advantages are that it is adjacent to an existing lodge facility that could be expanded to provide parking and a warming hut and food service for a small day use area. It also has patches of mountain hemlock which may make it more skiable during windy conditions than the open slope of Manitoba Mountain. The main disadvantages are that it lacks the terrain or the capacity of the other areas inventoried. It is also the farthest of all the inventoried areas with road access from Anchorage. In either potential capacity or vertical skiing terrain, it does not compare with the superior Manitoba site located 4 miles to the north. However, it does have the potential of supplying additional alpine skiing opportunities for local residents of the northern part of the Kenai Peninsula as a small day use area. Given its limited size and distance from Anchorage it does not appear to be able to meet the third criterion discussed in Chapter III. Redevelopment of Summit Lake as a day use area might be appropriate if neither Manitoba Mountain or Tincan Mountain are developed. It could complement major development at Glacier-Winner Creek since that development would not meet the local Kenai Peninsula needs because of the distance from that area.

Grandview -- is an area accessible only via the Alaska Railroad at Grandview Summit between Seward and Anchorage. The area has been the site of the Annual Ski Train Outting sponsored by the Anchorage Nordic Ski Club. Due to its limited access and greater than two hour travel time, this site does not meet the criteria established in Chapter II; therefore, it was not studied in detail nor is it considered a highly viable site in the foreseeable future.

Summary of Finding -- Six potential areas were inventoried of which three were identified as best being able to meet the projected demand. Glacier-Winner Creek, Tincan Mountain and Manitoba Mountain all appear to be able to supply the beginner-intermediate terrain capacities required to meet the projected demand on good snow years. The lower elevation of the base of Glacier-Winner Creek will provide less reliable base area snow conditions than the other areas which have twice the base elevation and greater distance from the marine influence of tide water. It is the closest area to Anchorage, but will require more road construction and clearing than the other two areas. Tincan Mountain has the greatest depth of snow but is farther from Anchorage and lacks the existing infra-structure that the Glacier-Winner Creek area has at Girdwood. Access is easy, but cross ridges complicate and limit run layout. Development may also cause a conflict or displacement of some of the present use.

Manitoba Mountain has the best beginner-intermediate terrain of any of the areas inventoried. It has less snow than the Turnagain Pass area, but still an adequate snow pack. It has the highest base elevation of the three areas and probably has the best snow conditions due to its distance from tidewater. It has one serious drawback, which is the one and one half to two hours driving time from Anchorage. It also lacks existing base facilities such as are located in Girdwood. However, it is the best major site to meet the needs of Kenai Peninsula residents and could be developed as a small day use area to meet their needs alone. A fourth site, Summit Lake, was identified as being suitable for meeting the local needs of Kenai Peninsula residents. Two other sites were inventoried, but are considered less responsive to the selection criteria. They are Seattle Creek and Grandview.

Chapter VII

SUMMARY

This study investigated the opportunities and demand for alpine skiing on the Anchorage District of the Chugach National Forest. Three separate facets were studied. First, an inventory of existing alpine ski area and a summary of hill capacities by skill level were made. Second, the demand was analyzed through a review of current literature, and by making a comparison of projected demands with reported actual use by skier skill levels. Third, an inventory was made of potential ski areas along existing travel corridors in the Chugach National Forest within two hours' driving time of Anchorage. The findings are summarized at the ends of Chapters IV, V an VI which each dealt separately with one of the three facets.

Conclusions

Based upon the findings and within the limitations of this study, the following conclusions were drawn.

- Theoretically, there is enough total capacity for Anchorage's present downhill skiing needs, but there is a serious lack of reliable beginner-intermediate terrain, particularly on poor snow years.

- Use will double by year 2000 based on projected population alone. With increases in participation rates or frequency rates it could double again. Facilities at Alyeska currently lack adequate lower intermediate slopes.

- Existing developed beginner slopes do not have reliable snow due to low elevations and coastal climatic influences.

- Making a comparison of survey results with actual use figures may indicate a latent demand for skiing by Anchorage residents.

- Alyeska has limited expansion potential within the existing permit boundaries and the immediately adjacent terrain is unsuitable for ski area expansion.

- Non-resident visitor use is currently less than one percent and provides a significant market potential, but will remain small compared to total resident use.

- Residents of the Kenai Peninsula currently have a participation rate lower than the national rate, indicating that there may be a latent demand for alpine skiing that would develop if opportunities are provided.

- There is a need to designate an area in addition to the present Alyeska site to provide reliable beginner-intermediate terrain.

- Additional developed capacity is also needed to provide for the alpine skiing demand that will result from the population doubling, to provide for increased participation rates, and to develop the visitor market potential.

- There are three potential major ski area sites, each with a high potential for providing beginner and intermediate terrain adequate to meet the current and anticipated alpine skiing needs. Additionally, there is a small site with development potential as a local day use area.

- All three of the major areas meet the evaluation criteria in varying degrees. They are:

  Glacier-Winner Creek is close to the existing resort community of Girdwood and is within an hours' drive of Anchorage. It has relatively low base elevation and close proximity to coastal climatic influences which indicate less reliable good snow conditions on the lower slopes. Additional weather and snow pack data needs to be collected, particularly for the base area. It would require the most expensive access of the three areas, but could use the existing infra-structure of Girdwood for overnight base facilities.

  Tincan Mountain at Turnagain Pass has the most snow of the three areas and has good access. It has some terrain problems, would require new base facilities and is a half hour further from Anchorage than Glacier-Winner Creek.

  Manitoba Mountain has the best beginner-intermediate terrain, the driest snow, easy access and minimal clearing needed for run development. It suffers from being twice as far from Anchorage as the Glacier-Winner Creek and would need new base facilities. It is the best located of the major sites to serve the Kenai Peninsula residents and could be developed either as a small day use area or as a larger regional facility.

Summit Lake is a small area, not considered large enough to meet the anticipated needs of Anchorage residents. It does have excellent potential for development as a small day use area to serve the local Kenai Peninsula population. Development of it might be appropriate if neither Manitoba Mountain nor Tincan Mountain are developed. It could complement major development at Glacier-Winner Creek.

Other factors beyond the scope of this study, such as environmental concerns, socio-economic impacts and public desires, need to be evaluated before any of these sites are selected for development.

Recommendations:

1. That adequate National Forest land be made available for expansion of alpine skiing to meet the future needs of Anchorage residents and visitors and the needs of the residents of the Kenai Peninsula borough.

2. That no area be developed that does not have reliable snow conditions particularly in the beginner-intermediate terrain.

3. That an environmental analysis be conducted to evaluate the social, economic, and physical environmental consequences of development at any of the three identified sites: Glacier-Winner Creek, Tincan Mountain #1 and #2, and Manitoba Mountain.

4. That adequate provisions be made for alpine skiing opportunities for the residents of the Kenai Peninsula Borough (ie. development of a small day use area either at Manitoba Mountain or Summit Lake if major alpine development is not planned for Tincan Mountain or Manitoba Mountain).

5. That weather data be gathered at the base of Glacier/Winner Creek.

6. That the three areas of highest potential be designated as study areas for ski area development in the Chugach Land Management Plan and exposed to public comment in the review process.

7. That the three study areas be withdrawn from mineral entry to prevent further incumbrances that could delay their development as ski areas.

8. That any new area developed for alpine skiing emphasize intermediate slopes but also provide for the needs of beginner and advanced skiers.

9. That Chugach National Forest winter sports planning efforts be coordinated with State, Municipal, and private land ski area developments.

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APPENDIX

Appendix A

United States
Department of
Agriculture

Forest
Service

CHUGACH NF

Reply to: 2550 Soil Surveys
2330 Recreation - Public Development Sites

Date: February 4, 1982

Subject: Terrain Analysis for Potential Site Area Development Sites

To: Arn Albrecht, Recreation, Soils & Water Staff

This report summarizes the terrain analysis for potential development at the Manitoba Mountain, Tincan Peak and Winner Creek, Seattle Creek and Summit Lake ski sites. A similar anslysis was done for the Alyeska and A[illegible]rtic Valley ski areas. The information was obtained from aerial photographs, topographic maps, other available data with some field checks. The report includes enlarged (4" - 1 mile) contour map sketches of the potential sites, with the ski slope categories delineated relative to difficulty and slope steepness.

Both the number of acres and the percent of total original area are given for each category of skier difficulty (Table I & Ia). Similar figures are given for the adjacent potential sites. Table III shows the maximum and minimum elevations and longest possible ski run within the original designated area.

The skier capacity (Table II) over the entire area indicated as skiable is presented for the beginner, intermediate and advance categories. Only the area that is visually acceptable was used in the calculations for all tree cover slopes. The upper mountain slopes are open and entirely skiable. One must realize that due to a variety of reasons much of this terrain will not be accessible; this has not been taken into account. Many deep canyons with extremely steep sidewalls that are probably not covered with snow in the winter or have severe avalanche problems are excluded from the calculations.

TABLE I PERCENTAGE OF USABLE LAND AREA IN THE BEGINNING, INTERMEDIATE AND ADVANCE SLOPE CATEGORIES

	Manitoba Mtn.		Tincan Pk.				Winner Ck.				Summit Lake			
			#1		#2		#1		#2		#1		#2	
	Acres	%	Acres	%	Acres	%	Acres	%	Acres	%	Acres	%	Acres	%
Beginning (15-25%)	801(1)	63	121	12	266	29	380	48	347	35	41	100	38	54
Intermediate (26-40%)	400	31	500	50	421	49	157	18	243	17			59	41
Advance (40%)	61	5	111	11	---	6	259	33	306	25			6	5
Restricted(2) (40%)	19	1	121	12	61	10				13				
Restricted(2) (26-40%)									88	4				
Restricted (2) (25%)			156	15	124	15			144	6				
	1281		1009		872		796		1,413	41			103	
					1,881				2,264					

(1) Ski terrain with a tree cover has been limited to the following percentages for visual, and land stability restrictions. a. Winner Ck. - 50%, b. Summit Lake - 25%, c. Tincan - 40%, d. Manitoba - 35%, e. Seattle Crk. - 25% on slopes 15-25% and 20% on slopes 26-40%.

(2) Areas inside of a potential ski area or a developed ski area that have restricted skiing due to low snowfall, steep unskiable, flat terrain, or designated avalanche areas.

TABLE Ia.

	Seattle Crk.				Alyeska				Arctic Valley				Arctic Valley Military	
	#1 Acres	%	#2 Acres	%	#1 Acres	%	#2 Acres	%	#1 Acres	%	#2 Acres	%	#1 Acres	%
15-25%	427	12	734	15	22	7	17	1	16	6	49	18	7	12
26-40%	1105	32	957	26	84	26	19	32	112	40	22	35	37	62
40%	1458	42	2054	46	132	41	16	40	150	54	32	47	16	26
Restricted < 25%		6			27	8	--	7						
Restricted 26-40%	99	3			20	6	--	5						
Restricted > 40%	162	5	751	10	39	12								
	3476		3745		324		52		278		103		60	
			7972				376				386			

TABLE II
POTENTIAL SKIERS PER ACRE OF LAND WITH IN DESIGNATED SKI AREA. (1)

	Beginner (20 spa)		Intermediate (10 spa)		Advance (5 spa)	
	#1	#2	#1	#2	#1	#2
Alyeska:	440(540)(2)	340	840(200)	190	660(195)	80
Winner Crk:	9,000	6,940	1,420	2,430	1,295	1,530
Arctic Valley:	180	980	750	220	670	135
Arctic Valley Military	140		370		80	
Manitoba Mtn.:	16,020	---	4,000	---	305	---
Tincan Pk.:	2,420	5,320	5,000	4,210	555	---
Summit Lake:	820	760	---	590	---	30
Seattle Lake:	8,540	14,680	11,050	9,570	7,299	10,270

1 These figures are a straight skier-per-acre number assuming that all the acreage can handle some type of skiing. The lower skier-per-acre numbers (Region-6, Title 2300, Recreational Management) are used to help compensate for the not-accounted-for, unserviceable & unskiable terrain. Hazards such as whiteout areas, high winds, exposed rock and cliffs, avalanche slopes, some extremely steep sides river canyons (except where designated) and uphill slopes are not excluded from these calculations.

2 Skier capacity in restricted areas. Some of these restricted acres may only be usable as be part of a higher skill level run due to inaccessability for beginners.

TABLE III. BASE & TOP ELEVATION OF AREAS (ORIGINAL)
& LENGTH OF LONGEST RUN

	Base Elevation	Top Elevation	Length of Run
Manitoba Mtn.	1,200	3,702	10,000
Tincan Pk.	1,100	3,300	9,000
Winner Crk	700	4,700	12,500
Summit Lake	1,350	1,750	2,000
Seattle Crk.	500	3,000	10,500
Alyeska	300	2,740	6,800
Arctic Valley	2,450	4,000	5,400

Geological Characteristics

Manitoba Mtn.: The lower one-quarter of the sideslope consists of alluvial sands, gravels, and cobbles up to 200 feet deep. Deep canyons with extremely steep sides have been cut into this material by active streams. The middle section of the mountain has been scoured by glaciers and covered in some areas by till deposited as the glaciers receded. There may be lenses of silt or clay size material up through this level. There is less evidence of glaciation farther up the sideslope. Many small tree covered knobs located in the upper flats appear to be bedrock controlled as are the upper sideslopes. The upper flat areas appear to be dominated by poor drainage and wet soils.

Tincan Peak: The lower flats consist mostly of poorly drained alluvial soils in between bedrock hills. Some areas have deep alluvial sands, gravels, and cobbles with deep, steep sided canyons cut by active streams. The lower half of the mountain is strongly dominated by tree covered, parallel, bedrock edges aligned across the slopes. Active streams have cut deep canyons through these bedrock ridges and parallel to them making access to the potential ski site extremely difficult and hazardous. Higher up the mountain these ridges become less significant. The ridges appear to be covered by a shallow, well drained soil and the lower areas between the ridges by a deeper poorly drainage soil. There appears to be an old land slide in the middle of the front slope. This may indicate a potential weakness in the bedrock which would affect lift tower locations, etc. The upper part of the mountain consists of bedrock ridges and loose rock talus.

Winner Creek: The lower flats consist mostly of poorly drained alluvial soils in between parallel bedrock hills, aligned across the slope. The middle slopes have been scoured and carved out by glaciers and then covered by variable amounts of till as the glaciers receded. The upper part of the mountain consists of parallel bedrock ridges aligned across the slope and slope covered places by talus. The low areas and small hills in the upper cirque basin consist of bedrock covered by deep, poorly drained and shallow, well drained soils respectively.

The entire mid to lower basin section of the potential ski site in the next canyon on Glacier Creek appears to consist of mixed glacial till and alluvial outwash from the glacier. This material is deeply incised in two places by active streams. The upper part of the mountains are dominated by bedrock with talus and a glacier.

Summit Lake: The entire slope appears to be under-layed by a mixture of alluvium and glacial till up to 100 feet thick. Lenses of silty or fine sandy soil soils are likely.

Seattle Creek: The valley bottom consists of relatively level bedrock with trees on the higher area with better drainage and open muskegs in the lower areas with poorer drainage. This area may be overlayed with some glacial till or/and alluvial silts, sands and gravels. Adjacent to Seattle Creek there are some alluvial river terraces. The lower part of the slope consists of an overlay of talus and debris deposited by avalanches off of the peak closes to Turnagain Arm to relatively well drained tree covered soils farther up the valley. The lower and middle slopes have been carved significcantly by glaciers and are probably overlayed with some glacial tilll. The upper basins and mountain slopes are dominated by bedrock on the ridges and slopes and loose glacial till and talus in the basins.

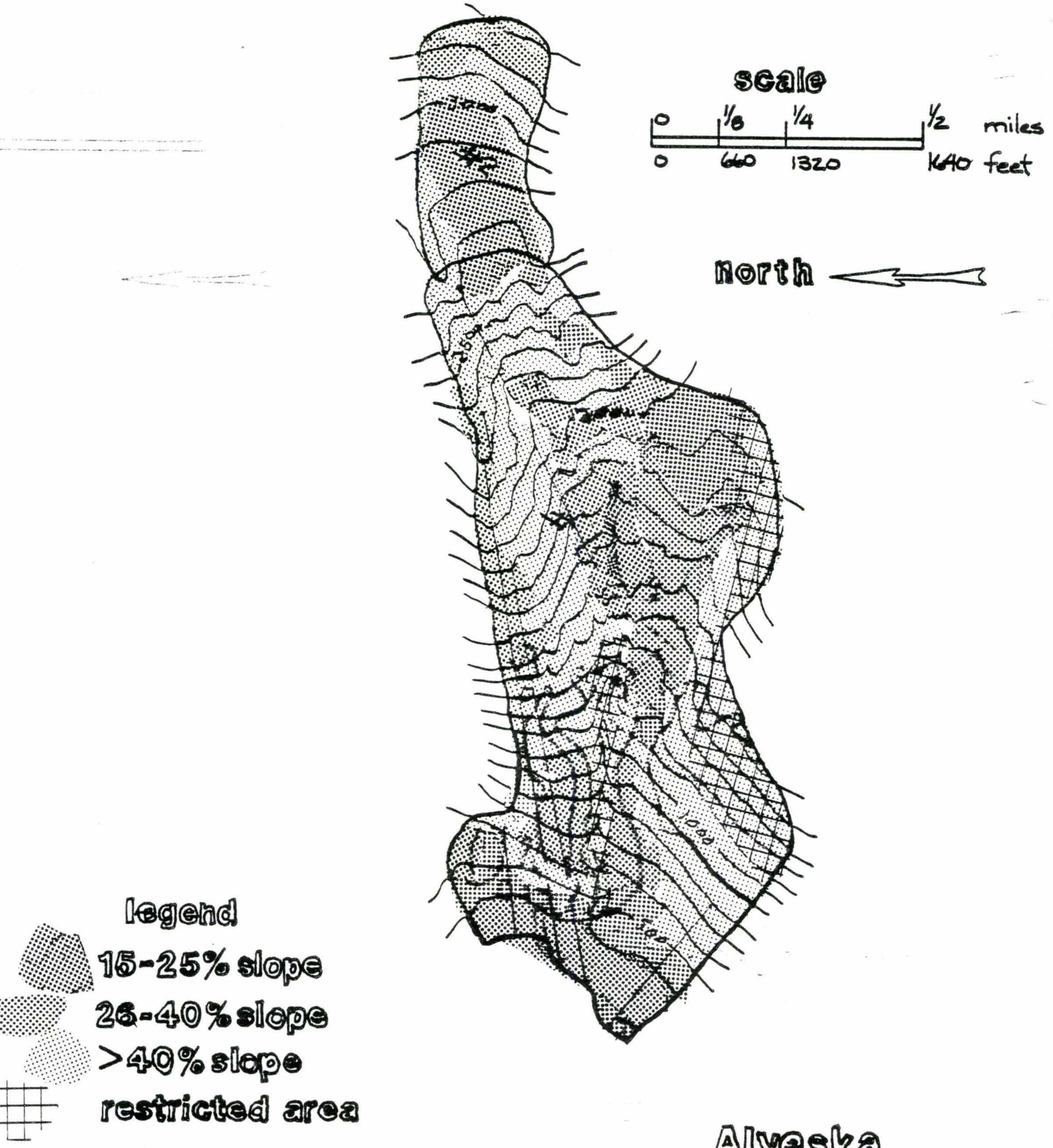
Alyeska and Arctic Valley Ski Areas: Both of these ski areas were analyzed for the amount of skiable terrain in each slope category. The data can be seen in Tables I and II.

Management Considerations: Major management concerns relate to the location and construction of lift towers, buildings and roads. Both the alluvial and glacial soils have lenses of silty and fine sandy soils which are unstable when wet.

Problems causing concern will be location of unstable and poorly drained soils, ice formation from subsurface drainage, frost leave, and snow creep. Any type of construction activities should avoid these areas. Sites suitable for buildings and roads should be available on tree covered rock hills and deep gravelly alluvial soils on the lower flats. Road locations should avoid cutbanks which will seep and cause ice formation. These areas are common where a cutbank intercepts a bedrock-soil contact. Once ssturated soils in this situation will slide on steeper slopes. Location of lift towers should avoid unstable or relatively poorly drained soils.

Dean S Davidson

DEAN DAVIDSON
Soil Scientist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0
1/8
1/4
1/2 miles
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660
1320
2640 feet
north
legend
15-25% slope
26-40% slope
>40% slope
restricted area

Alyeska

Figure 4

Appendix B

WEATHER DATA FOR SKI AREA EVALUATION

This report gives a brief, generalized summary of winter/spring weather conditions for six locations on the Chugach National Forest being evaluated for ski area potential. Several of the areas have had snow and/or weather data collected at or near them. Table I summarizes some of the snowpack information which has been used for this report. For areas where no data is available, I have extrapolated data from stations as close as possible. I have tried to consider localized weather effects as well. None of the selected locations will be extremely limited by seasonal snowpack, though some will have better and more consistent conditions than others. Higher elevation areas will usually have better snow conditions than lower areas. Higher elevation areas will also often have more extreme wind and weather conditions, though this is dependent on the surrounding terrain as well.

TABLE I

			Average Monthly Snow Pack in Inches					
Location	Elevation In Feet	Years Of Data	Dec 1	Jan 1	Feb 1	Mar 1	Apr 1	May 1
Mt. Alyeska	1200	9			83	99	121	112
Bertha Creek	850	12			40	50	55	50
Turnagain Pass	1000	4	26	60	57	88	97	105
Tin Can Mt.	1800	3	42	66	78	121	144	147
Kenai Summit	1390	12			38	44	46	35

1. Winner Creek

Weather and snowpack for the Winner Creek Area is projected to be very similar to Mt. Alyeska. Basically this means:

- Consistent, heavy snowfall during the winter months above 1000 feet in elevation. (See Snow Data From Mt. Alyeska)

- Occasional winter rains to 3000 feet in elevation.

- Inconsistent, non-dependable snow below 1000 feet. The bottom portion of Alyeska (300 to 1000 feet) often has inadequate, icy snow. Heavy snows to the upper mountain may come as rain to the lower mountain. This was particularly evident during the last two warm, wet winters. Average winter snowpack in Girdwood is about 15 inches as compared with 105 inches at 1200 feet on Mt. Alyeska and probably around 200 inches in the upper bowl of Mt. Alyeska. Winner Creek presumable has a very similar pattern. The lower elevation areas would often be sparcely snow covered and icy.

- Mt. Alyeska is relatively well protected from the prevailing winds (out of the east). The same would be expected for Winner Creek as it has a very similar orientation. The upper mountain and ridges will, however, have much more extreme wind and weather conditions than the lower bowl or than the Alyeska ski area.

- Temperatures would be very similar to Mt. Alyeska (-15°F to 40°F).

2. Turnagain Pass (Tincan Mt.)

Detailed weather data (snow, wind, temp.) was collected at the 1800 feet level on tincan Mt. from 1968-1972. Snowpack data was also collected at 1000 feet on Turnagain Pass. Snow course data collected by SCS is available for Bertha Creek, approximately 4 miles to the southwest of Turnagain Pass along the Seward Highway. Snowpacks at Turnagain Pass are significantly greater than those at Bertha Creek. This is probably due to the fact that storms moving through Portage Pass and Turnagain Arm drop considerable amounts of snow in the Turnagain Pass area and less snow further to the SW.

The following generalizations can be made about Turnagain Pass:

- Consistent, heavy snowfall during the winter months over the entire area (70 to 80 inches average winter snowpack at 1000 feet, 100 to 110 inches at 1800 feet)

- Occasional winter rains to 3000 feet in elevation.

- Rain crust more likely below 1500 feet, wind crust more likely above 2000 feet.

- Average winds at 1800 feet are approximately 5 mph. with occasional gusting to 30 + mph. Winds are lower at 1000 feet probably averaging 3 mph in the woods and higher at 3000 feet, probably averaging 10 mph. Detailed wind data from 1800 feet is available.

- Temperatures are similar to Mt. Alyeska at corresponding elevations. Detailed temperature data from the 1800 foot level is available.

3. Seattle Creek

No snow courses or detailed weather data exist for the Seattle Creek area, however, the area is located between Turnagain Pass and Mt. Alyeska and it should have weather characteristics similar to those two areas. Since Seattle Creek is slightly further down Turnagain Arm from Portage Pass (a passage for weather fronts out of the Gulf of Alaska) than is Turnagain Pass, it probably receives slightly less snowfall.

The following generalizations can be made about Turnagain Pass:

- Consistent heavy snowfall during the winter months over the upper 3/4 of the area. (65 to 75 inches average winter snowpack at 1000 feet, 90 to 110 inches at 1800 feet).

- Sparcer more inconsistent snow cover at the base (500 feet elevation). Likely the average winter snowpack is 35 inches. The base area will be much more heavily rain influenced than the upper mountain.

- Occasional winter rains to 3000 feet in elevation.

- This area is very well sheltered from the prevailing winds except for the upper ridges. Snow could occasionally be very wind crusted at the top. Wind conditions should be still more moderate than Turnagain Pass.

- Temperatures will be very similar to corresponding elevations on Turnagain Pass or Mt. Alyeska.

4. Manitoba Mt.

Snow course data has been collected for 12 years at Kenai Summit, one mile south of Manitoba Mountain Despite the higher elevations at Manitoba Mountain, snowpacks are generally much shallower than Mt. Alyeska or Turnagain Pass. This is due to the fact that Manitoba Mountain lies in a precipitation shadow of the Kenai Mountains. Storms moving out of Prince William Sound and the Gulf of Alaska have dropped out much of their moisture by the time they reach Manitoba Mountain.

The following generalizations can be made about Manitoba Mountain:

- Moderate snowpack throughout the winter, average 40 inches at the base, probably around 80 inches at the top.

- Occasional winter rains, but much more infrequent that Mt. Alyeska or Turnagain Pass.

- Moderate winds -- Greater wind velocities than Mt. Alyeska or Turnagain Pass. More extreme winds at the Summit. Common cornice formation at the summit.

- Colder temperatures than Mt. Alyeska by about 5°F at similar elevations. Occasional cold, windy, miserable weather at summit.

5. Summit Lake

This area has essentially the same climate as Manitoba Mountain, however, the elevation at the top of the proposed Summit Lake area is much lower than the Manitoba Mountain area. Snow depths at the top of the Summit Lake area would be less and wind and storms would be less extreme.

ENVIRONMENTAL EVALUATION OF POSSIBLE SKI AREA DEVELOPMENT ON THE CHUGACH NATIONAL FOREST

The matrices and maps attached with this report give a brief evaluation for six potential ski areas on the Chugach National Forest. Selection criteria for these areas include:

1. Accessibility to Anchorage.
2. Accessibility to existing transportation systems.
3. Availability of some intermediate and/or beginner terrain.
4. Gun implacements will not be needed for avalanche control.

Most of the areas looked at had other than southern exposures, however, southern exposure is not generally a limiting criteria for ski area development on the Chugach. Sun altitudes and radiation intensities are very low from November through February making southern exposures preferable from the skier's standpoint. During the spring season, however, southern exposures will have more variable (melt-freeze) snow conditions than northern exposures.

Following are some comments and personal opinions on the six areas evaluated.

1. Manitoba Mountain. This area has some beautiful intermediate and beginning terrain and its higher base elevation makes for better snow conditions. Access to the area as well as base area development would be fairly easy to deal with. After development of the most probable area (Manitoba #1), additional and more expert terrain could be considered for development at Manitoba #2 and #3. Distance from Anchorage (75 miles) is a drawback to this area. On the other hand, it is closer to Seward, Kenai, Soldotna, and other Kenai Peninsula towns than is the Girdwood area.

2. Turnagain Pass. This area is at relatively good access distance from Anchorage (50 miles) and generaly has very adequate snow conditions. Turnagain #1 (Tin Can Mountain) has easy access to its base and some good intermediate and beginning terrain on its south side. However the mountain is largely covered with cross-cutting ridges that will make skiing and area development very difficult. For this reason I don't see much of Turnagain #1 as having good potential.

   Turnagain #2 is more difficult to access, requiring a large bridge crossing on Ingram Creek. The mountain face is much less ridged than Turnagain #1 and offers some excellent, open, intermediate terrain. The lower slopes have good beginning terrain, though this would require considerable cutting and contouring (smoothing). This area has a northwest exposure and receives no sun during November, December, and January.

3. Winner Creek. This area is close to Anchorage (40 miles) and close to an existing area and ski complex. Access to the area will require considerable roading (3 to 4 miles) or construction of a large bridge across Glacier Creek. The skiing terrain is generally intermediate to expert and will need considerable

contouring. The upper mountain is ridged and will require considerable avalanche control. Winner Creek #2 has a particularly high percent of hazardous avalanche terrain. The lower mountain will have occasional icy conditions. The upper mountain will have spectacular views as well as the possibility of year-around skiing on the upper portion of Winner Creek #2.

4. Seattle Creek. This area is located about 50 miles from Anchorage and has a very large acreage (3,700) of primarily intermediate to advanced terrain. The base area could be set up to have lifts radiating out from it into three separate valleys. Snow condition should be similar to Turnagain Pass. The areas has slopes facing almost every cardinal direction. This could be a real advantage in terms of offering a variety of sunny and shaded terrain. Little cutting and contouring would be needed. On first evaluation, this appears to be an excellent area. The main disadvantage is access, which would require either a 7 mile road to be built into the base or chairlift/gondola access over from Turnagain Pass.

5. Summit Lake. This area is similar in almost all respects to Manitoba Mountain except that it is much smaller and presently has good road access. The area currently has a rope tow on its lower portion, but this has not been operated for several years. A small clairlift could be installed to access the whole area. The area could not handle very many skiers, and is small enough that it probably would not attract large Anchorage crowds.

6. Grandview. This area would be strickly railroad access which has definite limitations, though it could be an interesting possibility. It provides about 600 acres of primarily intermediate terrain. There is a possible expansion area to the northwest, but it has a relatively high avalanche danger. Very little clearing or contouring would be needed. The area would catch a lot of morning sun. It is high enough that it will collect significant amounts of snow and will perhaps have some extreme weather on its upper portion.

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Hydrologist

MANITOBA #1

Skiing Area Available with Minimal clearing needs.	960 acres
Skiing Area Available with significant timber clearing needs.	115 acres
Access	Road access is available to the base of this area. Road improvement is needed as well as a new bridge over Mills/ Canyon Creeks. The existing foot bridge crossing would be a good road bridge site.
Parking Area	Nearly 120 acres of flat land at the base of the area.
Gradient range of Slopes	15-50% Average 25%
Top and Bottom Elevations	Top - 3,400' Bottom - 1,150' (2,250' vertical)
Unstable Areas (Erosion Hazard)	Area appears quite stable. There are several wet areas half way up the mountain which could cause problems if heavy equipment were used on them.
Surficial Geology	The face of this area was planed out by a large valley glacier which moved down Canyon Creek Valley. The slope is remarkably smooth with little cross-cutting by rock bedding planes or fracture planes.
Terrain Contouring Needs	Very little mechanical contouring would be needed. The bottom 400' of elevation is a bit hummocky and needs work.
Hazards to Skiers	This is a remarkably safe, moderate area. Alder would need to be cut, and hummocks smoothed. The top of the mountain can occasionally be quite windy and the bottom icy.
Avalanche Danger	Virtually none of the outlined area would be avalanche endangered if packed out as a ski area. Areas to the north and south of the upper mountain do slide frequently.
Snowpack	Average maximum annual snowpack at the base is approx. 45", approx. 60" on the upper mountain. Average Feb. 1 snowpack is 35" at the base, 50" on the upper mountain.
Rain	Occasional rains during the winter would be inevitable but they are infrequent due to the higher elevation of this area.
Sun Exposure	All three areas face generally to the WNW. During Nov., Dec., and Jan. the sun doesn't strike the area until about 1 pm and then sets behind the mountains by about 2:30. By the end of Feb., sun hits most of the slopes by 10 am and sets at about 3:30 pm. After this date there is a rapid and lengthy increase in sun exposure.
Average Length of Ski Season	Likely Thanksgiving to early or mid May.

MANITOBA #2

Skiing Area Available with Minimal clearing needs.	190 acres
Skiing Area Available with significant timber clearing needs.	335 acres
Access	Access to this area could be extended from Manitoba #1 by both chairlifts and cat trails.
Parking Area	Use parking area for Manitoba #1.
Gradient Range of Slopes	20-50% Average 27%
Top and Bottom Elevations	Top - 2,800' (1,600' vertical) Bottom - 1,200'
Unstable Areas (Erosion Hazard)	Area is quite stable. A stream crossing is needed to get from Manitoba #1 to Manitoba #2. A stream crossing also is needed within this area.
Surficial Geology	Same as #1. The lower section of Manitoba #2 has been somewhat stream dissected. Generally these streams run paralle to the orientation of possible ski runs.
Terrain Contouring Needs	Some mechanical contouring needs on the lower portion of this slope along with timber clearing.
Hazards to Skiers	The lower portion of this area would be more hazardous due to hummocks, stream courses, and tight timber. There is a danger of skiing (falling) down into Canyon Creek.
Avalanche Danger	Virtually none. Areas further up the valley (east) will slide but don't endanger the outlined area. The few steep spots on the area could be controlled with hand charges.
Snowpack	Same as #1.
Rain	Same as #1.
Sun Exposure	Same as #1.
Average Length of Ski Season	Same as #1.

MANITOBA #3

Skiing Area Available with Mini- l clearing needs.	340 acres
Skiing Area Available with signi- cant timber clearing needs.	290 acres
Access	Access to this area would probably have to be by lifts or cat trails from Manitoba #1. A road could be developed along the east side of Canyon Creek.
Parking Area	Use parking area for Manitoba #1. It would be nice to have parking at the base of this area, but there is very little low gradient land available at the base. Small, perched lots could perhaps be constructed.
adient range of Slopes	20-100% (Advanced to Expert) Average 60% on upper mountain average 30% on lower mountain
p and Bottom Elevations	Top - 3,600' Bottom - 1,000' (2,600' vertical)
stable Areas (Erosion Hazard)	Generally stable. Several wet areas at mid-slope. Area is heavily dissected in its lower portion by stream courses and some slopes are oversteepened and could create erosion problems.
Surficial Geology	Same as #1. Lower portion is heavily stream dissected and will create some problems in terms of orientation of ski runs.
rrain Contouring Needs	Same as #2.
Hazards to Skiers	Same as #2, increased steepness of dissected stream courses.
alanche Danger	Moderate to high avalanche danger on the upper mountain. Control work would be needed but could be done with hand charges or an avalauncher.
Snowpack	Same as #1.
in	Same as #1.
n Exposure	Same as #1.
Average Length of Ski Season	Same as #1.

TURNAGAIN #1 (Tincan Mountain)

iing Area Available with Mini- l clearing needs.	340 acres
iing Area Available with signi- cant timber clearing needs.	365 acres
cess	Access and parking are available from the highway at Turnagain Pass. It may be necessary to push a road and parking area somewhat further in.
rking Area	Approx. 170 acres of flat land are available at the base of th area. Probably all of it is not compatible with parking use.
adient Range of Slopes	20-90% Aver. 36% on the upper portion. 22% on the lower porti .
p and Bottom Elevations	Top - 3,200' Bottom - 1,000' (2,100' vertical)
stable Areas rosion Hazard)	This area is generally quite stable. There are a number of wet, muskeg areas that could create a problem if any mechanical contouring were done.
rficial Geology	The proposed area, on the NW face of Tincan Mt., was formed by large valley glacier moving down the Granite Creek drainage. T s would have left a smooth, concave slope, however, there is a strong bedding or structural lineation in the bedrock trending NE/SW. Thus, a series of linear ridges have formed perpedicula to the slope gradient of the mountain.
rrain Contouring Needs	Much of this area has a very rough surface that would make dow hill skiing difficult. Skiers might have to walk up the back side of ridges to get downhill. Contouring needs could be immense and involve considerable amounts of blasting.
zards to Skiers	Cross cutting ridges present a considerable hazard to skiers. Snow conditions, particularly on the lower mountain can occasionally be quite icy.
alanche Danger	Very minor. Some control might be needed at the top and could e done with hand charges. Skiers should be kept from straying of of the sides, which are hazardous.
owpack	Average maximum annual snowpack at the base is approx. 100", 1 0" at the 1800' elevation and maybe 180" at 2500' elevation. Snowpack is usually quite adequate during the winter.
in	Rain will occur during the winter, though it is much more like y below 1200'. The lower part of Turnagain #2 is most prone to receive winter rains.
n Exposure	These two areas have a NW exposure and generally will not receive any sun during Nov., Dec. and Jan. (The south side of Turnagai #1 will receive few hours of afternoon sun.) By the end of Feb sunlight will strike most areas from 10:30 am to 3:30 pm. and shortly thereafter most of the day.
erage Length of Ski Season	Early to mid November - Early to mid May.

TURNAGAIN #2

Skiing Area Available with Minimal clearing needs.	365 acres
Skiing Area Available with significant timber clearing needs.	255 acres
Access	A road would need to be built from the highway to the base of this area. A bridge would need to be constructed over Ingram Creek at some point.
Parking Area	Approx. 70 acres of relatively flat land is available at the base of this area. This land appears to be wet, muskeg, and would need to be filled with gravel.
Gradient range of Slopes	12-70% Aver. 33% on the upper portion, 16% on the lower portion.
Top and Bottom Elevations	Top - 3,000' (2,500' vertical) Bottom - 500'
Unstable Areas (Erosion Hazard)	Same as #1.
Surficial Geology	The same as #1 except that the bedding or structural trend is much less pronounced and the upper mountain has a much smoother surface than on Turnagain #1.
Terrain Contouring Needs	This area has smoother terrain and would need much less contouring than #1. Timber cutting and some smoothing would be needed partcularly on the lower (beginner) area.
Hazards to Skiers	Same as #1. Less problem with ridges and more problem with icy conditions and lack of snow at the base.
Avalanche Danger	Same as #1.
Snowpack	Same as #1, except that the base is lower than #1 and occasionally will have scanty snow.
Rain	Same as #1.
Sun Exposure	Same as #1.
Average Length of Ski Season	Same as #1.

WINNER CREEK #1

Skiing Area Available with Minimal clearing needs.	510 acres
Skiing Area Available with significant timber clearing needs.	310 acres
Access	Access will either have to come approximately 3 to 4 miles from Alyeska along the east side of Glacier Creek with a bridge over Winner Creek or 1 to 2 miles from the Crow Pass Road with a bridge over Glacier Creek.
Parking Area	Approx. 25 acres of fairly level land exists near the base of this area. Additional spots could be leveled out without a lot o earth movement.
Gradient range of Slopes	20-100% Average 30%.
Top and Bottom Elevations	Top - 3,000' Bottom - 500' (2,500' vertical)
Unstable Areas (Erosion Hazard)	Generally quite stable. A few wet, boggy areas. One small incise stream.
Surficial Geology	This area was formed (scoured out) by a small, side valley glacier. As with Turnagain #1, there is a strong bedding or structural lineation perpendicular to the main slope gladient and consequently there are a number of cross cutting ridges, particularly on the upper mountain. Valley sidewalls are quite steep.
Terrain Contouring Needs	The lower portion of this mountain is very hummocky and would have high timber cutting and terrain contouring needs. The uppe mountain is very rough, but this roughness is dampened by heavy snowfalls. Some blasting and contouring would probably be neede
Hazards to Skiers	Cross cutting ridges and hummocky terrain would present a hazard to skiers. Conditions below 1200' elevation can be very icy and sometimes lacking in snow.
Avalanche Danger	There are numerous avalanche slopes on the upper part of this area. Extensive control work would be needed and could be done with hand charges or an avaluancher.
Snowpack	Average maximum annual snowpack is approx. 120" at 1200', 40" a the base, and 150" on the upper mountain. Low elevation snow ca occasionally be absent. Snow above 500 to 1000' will usually be abundant during the season.
Rain	Rain will occur occasionally during most winters, but mostly below 1200' elevation. This means that the lower slopes (presumably the intermediate slope on #1) will have the most difficult snow conditions.
Sun Exposure	Both Winner Creek #1 and #2 have general NW exposures. They will generally receive sun for a couple of hours in the afternoon during Nov., Dec. and Jan. By the end of Feb. the sunlight will strike these areas from 10 am to 3:30 pm and will increase quickly thereafter. Upper southern exposures (especially the upper portion of #2) will have much more sun exposure. Norther exposures will see very little sunlight until March.
Average Length of Ski Season	Generally the same as Alyeska (Thanksgiving-early May). The upper glacier on #2 could be open nearly year round.

WINNER CREEK #2

kiing Area Available with Mini-a clearing needs.	690 acres
kiing Area Available with signi-i nt timber clearing needs.	220 acres
ccess	Same as Glacier Creek #1 with an approximate 1 mile extension added to the road.
arking Area	Very little level land exists at the base of this area. Either Winner Creek #1 lots would have to be used, or small, perched lots would have to be built.
radient range of Slopes	25-100% Average 35%.
op and Bottom Elevations	Top - 4,500' (3,700' vertical) Bottom - 800'
n table Areas (Erosion Hazard)	The upper area is a small glacier with active glacial moraine at its base. Two active, incised, glacial streams run down the lower mountain and would probably need to be bridged.
urficial Geology	This side valley still has a small glacier at its head. The valley bottom is largely filled with morainal material (or ice) and bedrock features do not show up prominently except on the steep valley walls. The lower part of the area was smoothed out by a glacier which moved down through Glacier Creek valley. This section is now sharply dissected by two glacial streams.
errain Contouring Needs	The lower portion would need timber and alder cutting as well as some contouring and bridging of streams. The upper mountain would need little in the way of contouring.
azards to Skiers	This area has some very steep terrain and rock sidewalls which could present a hazard to skiers. The top of the area at 4500' elevation will have some extreme weather. The bottom will be often icy and occasionally lacking snow.
va anche Danger	Same as #1 except there are dangers on the lower mountain as well and one or more gun implacements might be needed.
n pack	Same as #1.
a	Same as #1.
un Exposure	Same as #1.
ve age Length of Ski Season	Same as #1.

SEATTLE CREEK

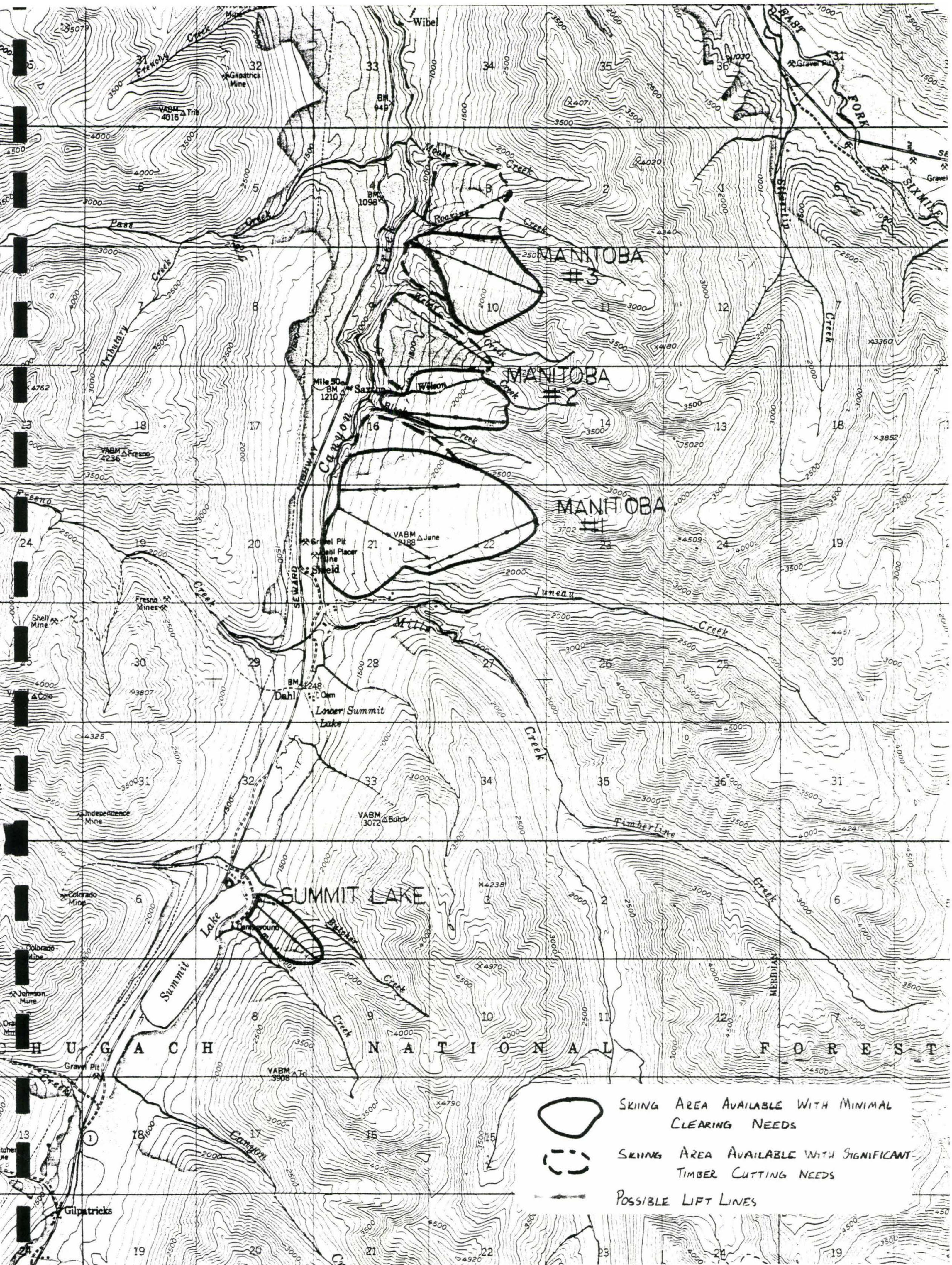
iing Area Available with Mini- l clearing needs.	3700 acre total (This is a big area)
iing Area Available with signi- cant timber clearing needs.	Only small amounts of timber cutting (mostly glading and some small openings would be needed at the base) approx. 40 acres.
cess	Access would have to come from the base of Turnagain Pass, around Turnagain Arm. This would involve approx. 7 miles of new road construction and two bridge crossings of Seattle Creek. Approx. one mile of powerline would have to be run to the upper lift tower from the Turnagain Pass powerline. Power could then be carried down the lift line to the base area. Gondola or chairlift access could be provided from the Turnagain Pass road as a alternative.
rking Area	Parking could present a problem in this area. There is lots of flat land about 1/4 to 1/2 mile below the base area, but right at the base area probably small perched lots would be needed.
adient Range of Slopes	15-80% Average 27-30%
p and Bottom Elevations	Top - 3,300' (2,800' vertical) Bottom - 500'
stable Areas rosion Hazard)	Each of the three drainages on this area have incised streams and would need to be bridged in spots. Some steep, poorly vegetated gullys exist in the upper bowl.
rficial Geology	This area is made up of about 4 circ basins, formed by small circ glaciers which flowed down into Seattle Creek valley. The area has been considerably weathered since glaciation and streams in the lower circ valleys have incised. Bedding and/or fault planes do not show prominently on the land surface.
rrain Contouring Needs	This entire area is relatively smooth. Some contouring would be needed to remove small hummocks, particularly near the base. Bridging of incised drainages would be needed. Only a small amount of timber cutting would be needed.
zards to Skiers	Incised drainages and some steep gullys in the upper basin. Som hummocky areas. Frequent icy conditions at the base. Good protection from the wind except on the upper ridges.
alanche Danger	Danger in steep gullys and several steeper slopes. All areas could be accessed easily with hand charges.
owpack	Similar to Turnagain Pass and Alyeska. Average maximum annual snowpack will be about 40" at the base, 120" at 1200' elevation and 150" at 2500' elevation. Snow will occasionally be scanty at the base.
in	Rain will occur occasionally during most winters, but mostly below 1200' elevation. This means that the lower slopes will have the most difficult snow conditions.
n Exposure	There is a general NW exposures to the area, however the upper circ basins have slopes oriented in almost all directions. There are several southern exposures which will get lots of winter sun. The lower mountain will get sun by about 1:30 pm during Nov. Dec. and Jan., and most of the day by early March.

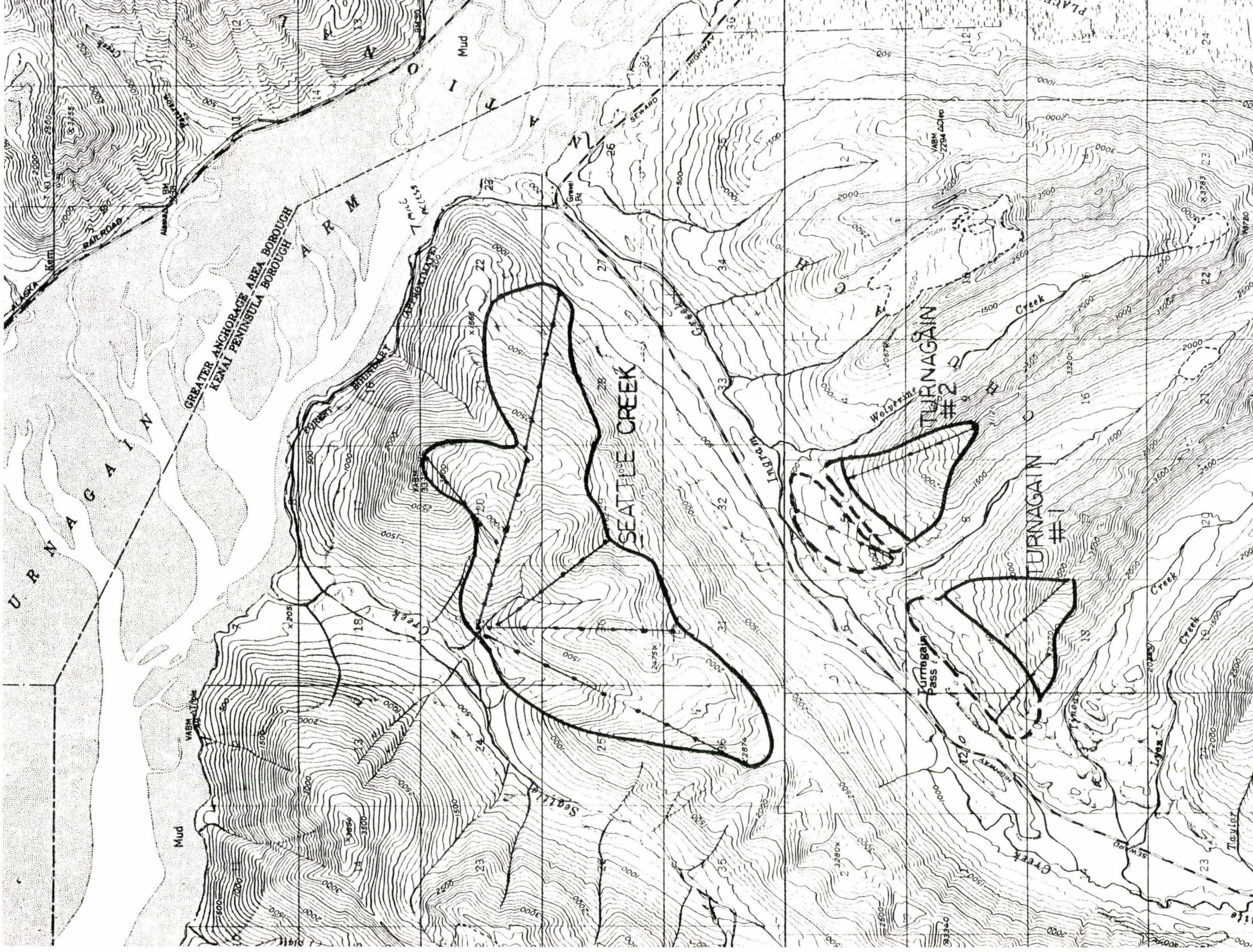
SUMMIT LAKE ROPE TOW

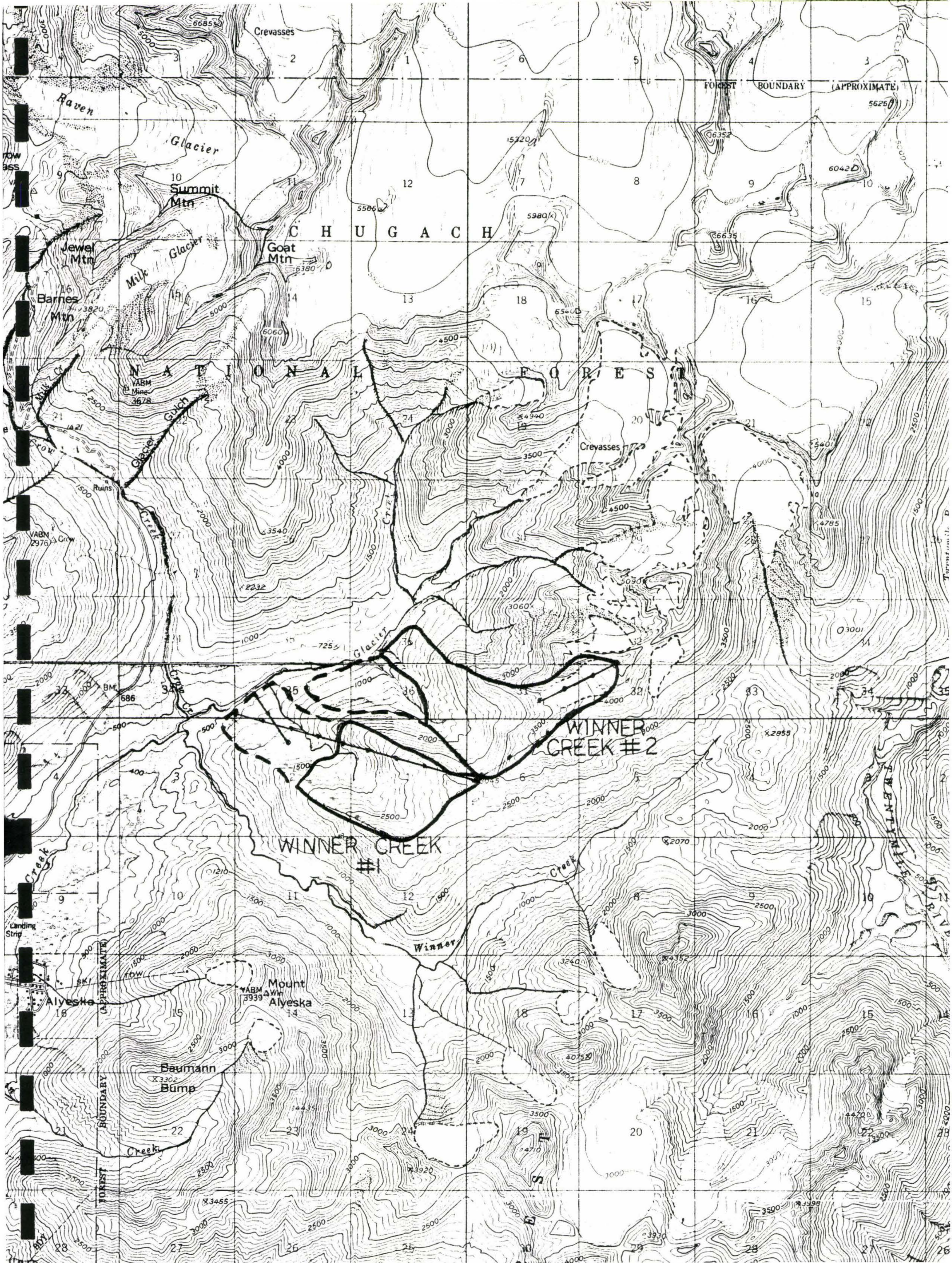
Skiing Area Available with Minimal clearing needs.	12 acres (Possible expansion to 130 acres)
Skiing Area Available with significant timber clearing needs.	30% of expansion area.
Access	Available - Tenderfoot Campground Road
Parking Area	Approximately 20 acres available along Summit Lake.
Gradient Range of Slopes	Rope tow 18-22%; Expansion 18-50%; Average 32%.
Top and Bottom Elevations	Top (Expansion) - 2,500' (1,100' vertical) Bottom - 1,400'
Unstable Areas (Erosion Hazard)	Small, relatively stable area.
Surficial Geology	The face of this area was planned out by a large valley glacier which moved down Canyon Creek valley. The slope is remarkably smooth with little cross cutting by rock bedding planes or fracture planes.
Terrain Contouring Needs	Very little contouring would be needed. The bottom segment may need work.
Hazards to Skiers	Few terrain hazards.
Avalanche Danger	The top 1/4 of the expansion steepens and could possibly need occasional control work.
Snowpack	Average maximum annual snowpack at the base = 47". Average Feb. 1 snowpack at the base = 38".
Rain	Occasional winter rains would be inevitable but they are infrequent due to the higher elevation of this area.
Sun Exposure	This area generally faces WNW. During Nov. Dec. and Jan. the sun is striking the area from 1 pm to 2:30 pm. By the end of Feb. the sun hits the slopes by 10 am and sets at 3:30 pm. After this, sunlight hours increase rapidly.
Average Length of Ski Season	Likely early December through early or mid May)

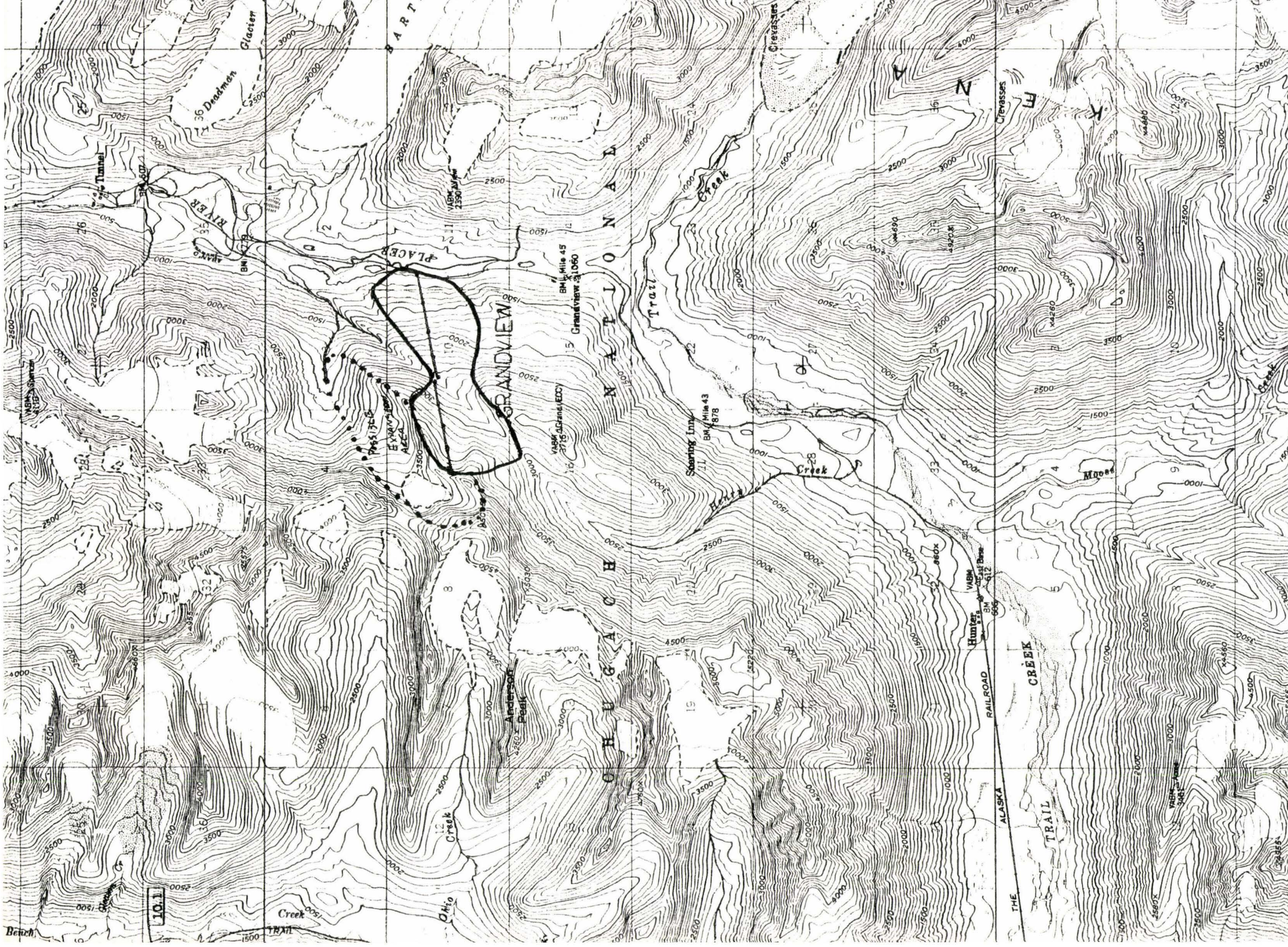
GRANDVIEW (RAILROAD ACCESS)

Skiing Area Available with Minimal clearing needs.	600 (There is considerable expansion terrain however, it appears to have some serious avalanche problems from above.
Skiing Area Available with significant timber clearing needs.	Only a little bit of the lower area. Perhaps 5% of the total area. Considerable alder would need removing.
Access	Alaska Railroad. The base area is 1 mile from the Grandview station.
Parking Area	Available - but not needed.
Gradient range of Slopes	30-50% 35% Average
Top and Bottom Elevations	Top - 4,000' Bottom - 1,000' (3,100' vertical)
Unstable Areas (Erosion Hazard)	A few small wet areas on steep slopes show erosion hazards. A deeply incised drainage diagonals across the area.
Surficial Geology	The lower side of this area was formed by the scouring of a large valley glacier which moved down the Placer River Valley. The upper area was formed by a smaller circ glacier. A deeply incised drainage has developed in a fault plane which diagonals across the upper mountain. Other than this, strong bedding or faulting planes do not show up and the topography is generally smooth or slightly knobby.
Terrain Contouring Needs	Very little contouring would be needed at this area. Especially considering the high snowfalls in the area. Bridging of the upper drainage might be needed.
Hazards to Skiers	The drainage which diagonals, across the upper mountain would probably present the greatest hazard. There are a few rocky and hummocky areas which could also present a problem. The upper mountain can have extreme weather.
Avalanche Danger	The upper bowl has avalanche danger around its upper edge. This could be controlled with hand charges or an avalauncher.
Snowpack	This area receives heavy snowfalls. Average maximum annual snowpack at the base is probably 80+ inches. And much greater higher up. Storms and wind at the higher elevation could be a problem.
Rain	Occasional winter rains will be inevitable but they are infrequent due to the higher elevation of this area.
Sun Exposure	This area has an ENE exposure and would catch about 1 to 2 hours of morning sun during Nov. Dec. and Jan. By late Feb. sunlight hours would be 8:30 am to 2:00 pm and would increase rapidly after that.
Average Length of Ski Season	Likely early November through mid to late May.

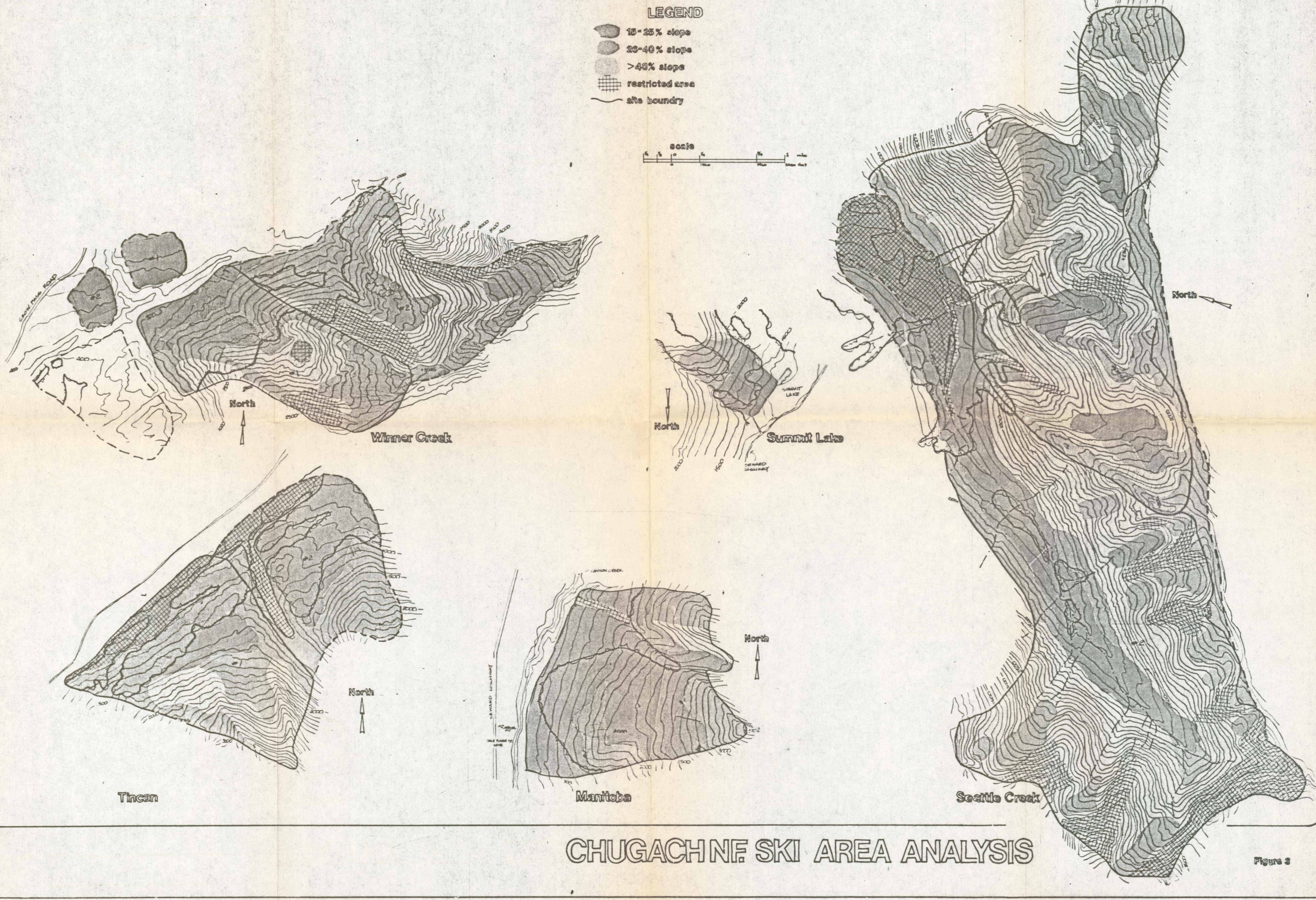

MANITOBA #3
MANITOBA #2
MANITOBA #1
SUMMIT LAKE
Skiing Area Available With Minimal Clearing Needs
Skiing Area Available With Significant Timber Cutting Needs
Possible Lift Lines
C H U G A C H   N A T I O N A L   F O R E S T
Wibel
Frenchy Creek
Gilpatrick Mine
Pass Creek
Tributary Creek
Moose Creek
Roaring Creek
Quartz Creek
Wilson Creek
Fresno Creek
Juneau Creek
Mills Creek
Canyon
Seward Highway
Mile 50
Saxton
Shield
Dahl Placer Mine
Gravel Pit
Fresno Mines
Shell Mine
Dahl
Lower Summit Lake
Independence Mine
Colorado Mine
Johnson Mine
Summit Lake
Campground
Butcher Creek
Timberline Creek
Canyon Creek
Gilpatricks
East Fork Sixmile
Sterling
MERIDIAN
VABM 4015 Trib
VABM 4236 Fresno
VABM 2188 June
VABM 3072 Butch
VABM 3908 Tri
BM 1098
BM 1210
BM 1248


SEATTLE CREEK
TURNAGAIN #2
TURNAGAIN #1
TURNAGAIN ARM
GREATER ANCHORAGE AREA BOROUGH
KENAI PENINSULA BOROUGH
FOREST BOUNDARY (APPROXIMATE)
7 mile access
ALASKA RAILROAD
SEWARD HIGHWAY
Mud
Wolverine Creek
Ingram Creek
Seattle Creek
Lyon Creek
Taylor
Turnagain Pass
Gravel Pit
VABM 3370
VABM 2294
x 1566
x 2475
2874
x 3280
x 3694
x 3255
x 3783
3320
3124
x 205
2067


Crevasses
Raven Glacier
Summit Mtn
Goat Mtn
Jewel Mtn
Barnes Mtn
Milk Glacier
CHUGACH
NATIONAL FOREST
FOREST BOUNDARY (APPROXIMATE)
VABM Mine 3678
Glacier Gulch
Crow Creek
Ruins
VABM 2976 Crow
Crevasses
Glacier
BM 686
WINNER CREEK #1
WINNER CREEK #2
Winner Creek
Landing Strip
SKI TOW
Alyeska
VABM 3939 Mount Alyeska
Baumann Bump
BOUNDARY (APPROXIMATE)
FOREST BOUNDARY
Creek
TWENTYMILE RIVER
6685
6352
5626
6042
5320
5980
5585
6380
6635
6540
6060
3820
4940
5540
4785
4500
5090
3540
3060
3001
2232
725
2855
2070
1210
4352
3240
4075
4435
3302
3920
4710
4470
3455
3930
3995



Deadman Glacier
Tunnel
PLACER RIVER
GRANDVIEW
POSSIBLE EXPANSION AREA
CHUGACH NATIONAL
Grandview
BM Mile 45
Trail Creek
Crevasses
Shering Inn
BM Mile 43
Creek
Moose
Anderson Peak
Ohio Creek
Hunter
ALASKA RAILROAD
THE TRAIL CREEK
Spencer
Creek
Beach
10.1


LEGEND
15-25% slope
26-40% slope
>40% slope
restricted area
site boundry
scale
miles
feet
North
Winner Creek
Crow Creek Road
Summit Lake
Seward Highway
Tincan
Manitoba
Seward Highway
Seattle Creek

CHUGACH N.F. SKI AREA ANALYSIS

Figure 3